DEPARTMENT OF THE AIR FORCE **QTP24-3-C507**
Headquarters US Air Force **14 January 2019**
Washington, D.C. 20330-1030

Mine Resistant Ambush Protected (MRAP) Vehicle

Vehicle Management Codes: C507, L290 – L296

QUALIFICATION TRAINING PACKAGE

CONTENTS

Section 1—OVERVIEW

1.1. Overview.

1.1.1. Send comments and suggested improvements on Air Force (AF) Form 847, *Recommendation for Change of Publication* through Air Force Installation and Mission Support Center (AFIMSC) functional managers via e-mail at AFIMSC.IZSL.VehicleOps@us.af.mil.

1.1.2. How to use this plan:

1.1.2.1. Instructor:

1.1.2.1.1. Provide overview of training, **Section 2** and **Section 3**.

1.1.2.1.2. Instructor's lesson plan for trainee preparation, give classroom lecture, **Section 4**.

1.1.2.1.3. Instructor's lesson plan for knowledge training, **Section 5**.

1.1.2.1.4. Instructor's lesson plan for demonstration, **Section 6**.

1.1.2.1.5. Instructor's lesson plan for performance and evaluation, **Section 7**.

1.1.2.2. Trainee:

1.1.2.2.1. Reads this entire lesson plan prior to starting lecture.

1.1.2.2.2. Follows along with lecture using this lesson plan and its attachments.

1.1.2.2.3. Uses **Attachment 2** and **Attachment 4** as guides for vehicle inspection.

1.1.2.2.4. Takes performance test.

Section 2—RESPONSIBILITIES

2.1. Responsibilities.

2.1.1. The trainee shall:

2.1.1.1. Ensure the trainer explains the Air Force Qualification Training Plan (AFQTP) process and the responsibilities.

2.1.1.2. Review the AFQTP/Module/Unit with the trainer.

2.1.1.3. The trainee should ask questions if he/she does not understand the objectives for each unit.

2.1.1.4. Review missed questions with the trainer.

2.1.2. Instructor shall:

2.1.2.1. Review the AFQTP with the trainee.

2.1.2.2. Conduct knowledge training with the trainee using the AFQTP.

2.1.2.3. Grade the review questions using the answer key.

2.1.2.4. Review missed questions with the trainee to ensure the required task knowledge has been gained to complete the task.

2.1.2.5. Sign-off the task(s).

2.1.3. The Certifier shall:

2.1.3.1. Evaluate the Airman's task performance without assistance.

2.1.3.2. Sign-off the task(s).

Section 3—INTRODUCTION

3.1. Objectives.

3.1.1. Given lectures, demonstrations, hands-on driving session, and a performance and a written test, trainees will be able to perform operator's inspection and complete the performance test with zero instructor assists.

3.1.1.1. Train and qualify each trainee in safe operation and preventive maintenance of the various MRAP.

3.1.1.2. This training will ensure the trainee becomes a qualified MRAP operator; an operator who has the knowledge and skills to operate a MRAP in a safe and professional manner.

3.2. Desired Learning Outcomes.

3.2.1. Understand the safety precautions to be followed before-, during-, and after- operation of the MRAP.

3.2.2. Understand the purpose of the MRAP and its role in the mission.

3.2.3. Know the proper operator maintenance procedures of the MRAP, in accordance with (IAW) applicable technical orders (TOs) and use of AF Form 1800.

3.2.4. Safely and proficiently operate the MRAP.

3.2.5. Know the proper procedures of operating the 4X4 system on the MRAP.

3.2.6. Know the towing limitations of the MRAP vehicle.

3.2.7. Know the key operating characteristics/procedures while driving forwards, backwards, turning, towing, expedient field repairs, and over adverse terrain.

3.3. Lesson Duration.

3.3.1. Recommended instructional and hands on training time is 47 hours:

Figure 3.1. Recommended Training Time for Training Activities.

Training Activity	Training Time
Trainee's Preparation	5 Hours
Instructor's Lecture and Demonstration	10 Hours
Trainee's Personal Experience (to build confidence and proficiency) ▪ Perform Operator Maintenance ▪ Operate the Vehicle	30 Hours
Trainee's Performance Evaluation	2 Hours

Note: This is a recommended time; training time may be more or less depending how quickly a trainee learns new tasks.

3.4. Instructional References.

3.4.1. Risk Management (RM) and Safety Principles IAW Air Force Pamphlet (AFPAM) 91-803, *Risk Management (RM) Guidelines and Tools*.

3.4.2. Applicable TOs or Manufacturer's Operator's Manual (see Vehicle Management for TO number for vehicle being used in training).

3.4.2.1. TM 9-2355-106-10.

3.4.2.2. TM 10001624.

3.4.3. Air Force Manual (AFMAN) 24-306, *Operation of Air Force Government Motor Vehicles*.

3.4.4. AF Form 1800, *Operator's Inspection Guide and Trouble Report* (General Purpose Vehicles).

3.5. Instructional Training Aids and Equipment.

3.5.1. MRAP Lesson Plan.

3.5.2. MRAP.

3.5.3. Slave cable.

3.5.4. Tire pressure gauge.

3.5.5. Applicable TO or Manufacturer's Operator's Manual.

3.5.6. AF Form 1800, *Operator's Inspection Guide and Trouble Report* (General Purpose Vehicles).

3.5.7. MRAP Operator New Equipment Training (ONET) PowerPoints.

3.5.8. Videos (if locally produced).

3.5.9. Suitable training area.

Section 4—TRAINEE PREPARATION

4.1. Licensing Requirements.

4.1.1. Trainee must have in his/her possession a valid state driver's license.

4.1.2. AF Form 171, *Request for Driver's Training and Addition to U.S. Government Driver's License* IAW Air Force Instruction (AFI) 24-301.

4.1.3. Applicable local licensing jurisdiction requirements.

4.2. Required Reading (Testable Material).

4.2.1. Read this entire lesson plan.

4.2.2. Read AFMAN 24-306.

4.2.3. Read Manufacturer's Operator's Manual for the vehicle being trained on.

Section 5—KNOWLEDGE LECTURE AND EVALUATION

5.1. Overview of Training and Requirements.

5.1.1. Training objectives:

5.1.1.1. Given lectures, demonstrations, hands-on driving session, and a performance and a written test, trainees will be able to perform operator's inspection and complete the performance test with zero instructor assists.

5.1.1.2. Train and qualify each trainee in safe operation and preventive maintenance of the various MRAPs.

5.1.1.3. This training will ensure the trainee becomes a qualified MRAP operator—an operator who has the knowledge and skills to operate a MRAP in a safe and professional manner.

5.1.2. Desired learning outcomes:

5.1.2.1. Understand the safety precautions to be followed before-, during-, and after-operation of the MRAP.

5.1.2.2. Understand the purpose of the MRAP and its role in the mission.

5.1.2.2.1. MRAP vehicles are Commercial Off-The-Shelf (COTS) vehicles designed from the ground up to reduce casualties and increase survivability for personnel subjected to mine explosions, improvised explosive devices (IED) detonations, and small arms fire. Blast forces are deflected away from the crew with the vehicles v-shaped hull.

5.1.2.2.2. The purpose of MRAP vehicles is to provide added ballistic protection for armament components, crew, and ammo.

5.1.2.2.3. Role in the mission (Unit/Base/Community (during natural disasters)/Air Force).

5.1.2.2.3.1. MRAP vehicles will be capable of supporting multiple missions to include recon, convoy operations, troop transport, ambulance, combat engineer, and explosive ordinance disposal (EOD) missions for maneuver units.

5.1.3. MRAP design. The design of MRAP varies depending on the vehicle type/model. Refer to the manufacturer's operator's manual for additional information on the specific MRAP being operated and to the data plate for specifications. The MRAP normally can be identified by the following characteristics:

5.1.3.1. Specifications. Specifications vary based on vehicle type/model. The operator should be familiar with the specifications of the vehicle that he/she is operating to include, but not limited to: Dimensions, weight, engine drive train information, turn radius, fluid types, etc. See **Table 5.1.** for an example of MRAP vehicle specifications found on the vehicle data plate and manufacturer's operator's manual.

Table 5.1. MRAP Specifications Example (varies by vehicle type/model).

MRAP Specifications (varies by vehicle type/model)	
Height	159" (13 ½ feet)
Length	260" (21 ¾ feet
Width	120" (10 feet)
Weight	31,132 lbs.
Fuel	Diesel/ 70 gallons. USE DF-1 or DF-2 ONLY

5.1.3.2. MRAP design components.

5.1.3.2.1. Armor protection. MRAPs are equipped with an armor protection system designed for mine blast protection and blast of the hull, roof protection from overhead airburst and side protection against fragmentation and blast. Protection parameters vary by MRAP type/model. Features may include:

5.1.3.2.1.1. A floor with a V-shaped "belly" that can deflect and absorb blast-waves and shrapnel from IEDs and land mines.

5.1.3.2.1.2. Individual side facing energy absorbing seats for blast protection.

5.1.3.2.2. Hydraulic activated doors/steps. The MRAP is equipped with driver and passenger-side hydraulic activated doors and a rear step ramp for crew members.

5.1.3.2.3. NBC protection.

5.1.3.2.3.1. Life support system (LSS) providing NBC protection, ventilation, and climate control. An heat, ventilation and air conditioning (HVAC)/LSS that regulates fresh and re-circulated air within the cabin and provides protection from outside extreme hot or cold temperatures.

5.1.3.2.3.2. In wartime configuration, the system provides protection from NBC agents by a special filter.

5.1.3.2.4. Fire suppression system.

5.1.3.2.4.1. Protects personnel from fire. The crew compartment is equipped with a water-mist fire suppression that protects personnel from fire.

5.1.3.2.5. Automatic operation. Only the cabin and engine systems are automatic, and all of the systems can be operated automatically in the event of a malfunction.

5.1.3.2.6. Run flat tires. Run on a hard surface road after complete loss of air pressure in any two tires.

5.1.3.2.7. Blackout (BO) operations. Ability to drive during BO operations with BO markers/BO drive.

5.1.3.3. MRAP additional parts.

5.1.3.3.1. Turret (if applicable). Some MRAPs have a circular hatch with gun mounting and the gun ring mount can rotate for 360 degree field of fire and accepts a variety of crew-served weapons.

5.1.3.3.2. Winch (if applicable). Some MRAPs are equipped with a self-recovery winch.

5.1.3.4. Steering.

5.1.3.4.1. Front wheel steering.

5.1.3.5. Air brakes.

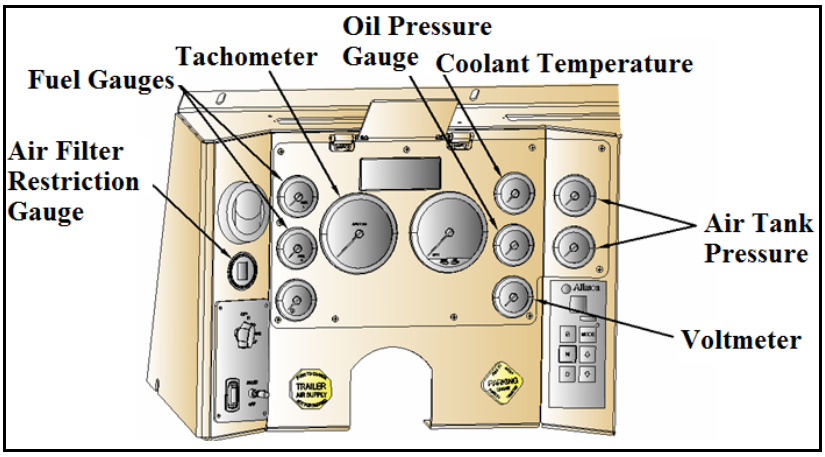
5.1.3.5.1. The service brake system is pneumatically operated. It has a 6-wheel drum brake S-cam operated system.

5.1.3.5.2. The MRAP has an air activated anti-lock brake system (ABS). Air pressure for brake operation is provided by an engine mounted compressor.

5.1.3.5.3. The ABS system has an electronic control unit (ECU) that manages brake system operation and provides diagnostic information in the event of a problem.

5.1.4. Gauges, switches, instruments, lights and controls:

Figure 5.1. Switches/Controls/Gauges.



5.1.4.1. Switches/controls/gauges. See **Figure 5.1.**

5.1.4.1.1. Start/run switch.

5.1.4.1.2. Brake warning indicator-lights when fluid is low or parking brake is set.

5.1.4.1.3. Engine temp. Temperature exceeds 230°F (110°C) and deactivate when engine temperature drops below 230°F (110°C).

5.1.4.1.4. High beam indicator.

5.1.4.1.5. Engine oil pressure – normal range varies for each MRAP model. See manufacturer's operator's manual/data plate.

5.1.4.1.6. Speedometer.

5.1.4.1.7. Voltmeter – normal = in the green.

5.1.4.1.8. Air filter restriction gauge.

5.1.4.1.9. Air tank pressure.

5.1.4.1.10. Fuel gauges – indicate supply in each tank; diesel or JP8 only.

5.1.4.1.11. Tachometer.

5.1.4.1.12. Coolant temperature.

5.1.4.1.13. Heater controls – defrost, heat or fan.

5.1.4.1.14. Main light switch control panel controls service, blackout and panel lights.

5.1.4.1.15. Directional signal control and warning hazard lever.

5.1.4.1.16. Dimmer switch.

5.1.4.1.17. Seat adjustment.

5.1.4.1.18. Air cleaner indicator: normal = yellow or up to 24%; red = needs cleaning or filter replacement.

5.1.4.1.19. Windshield washer/wiper control.

5.1.4.1.20. Windshield deicer; used to defrost ice and snow from windshield.

5.1.4.1.21. A/C on/off turns on or off refrigerated air.

5.1.4.1.22. Transmission shift lever: (R – Reverse, N – Neutral, D – Drive).

Note: Transmission must be in the position "N" and the vehicle must be stopped before shifting transfer case.

Table 5.2. Transmission Shift Lever Controls.

Gear	Description
Low lock (L)	For climbing or descending steep hills or driving in snow.
Neutral (N)	No power is applied to the wheels.
High (H)	For normal driving and fording.
High lock (H/L)	For driving through mud, sand, snow, off-road or slippery conditions.

5.2. Vehicle Inspection.

5.2.1. Pre-trip vehicle inspection test. Use **Attachment 2** as a walk-around guide along with AF Form 1800.

5.2.2. Pre-inspection.

5.2.2.1. Ensure engine is off.

5.2.2.2. Cleanliness/damage/missing items (Always keep the vehicle clean inside and out).

5.2.2.3. All wheel rims (cracks, splits, etc.); check for loose or missing lug nuts.

5.2.2.4. Welds. Look for loose or chipped paint, rust or gaps where parts are welded together. (If a loose weld is found, contact the VCO or maintenance immediately. See **Figure 5.2.**

Figure 5.2. Welded Parts.

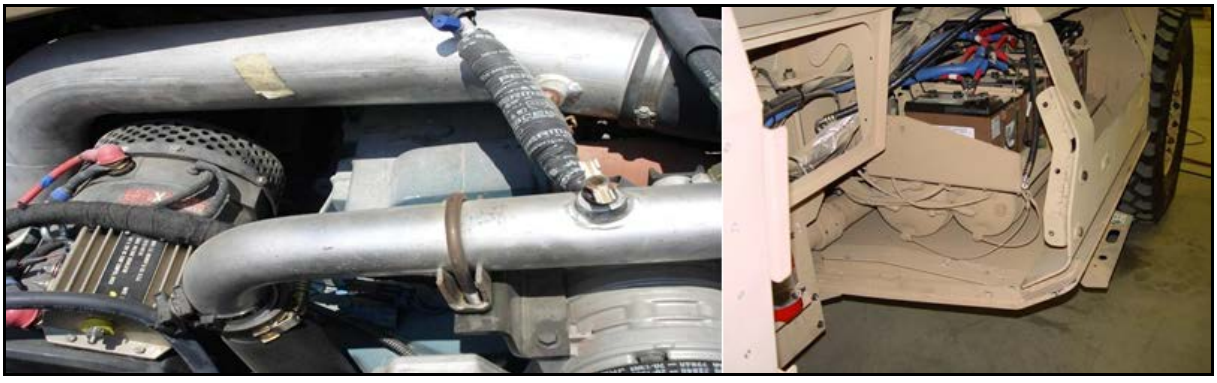
5.2.2.5. Tighten loose connectors and make sure wires are tight. See **Figure 5.3.**

Figure 5.3. Connectors and Wires.

5.2.2.6. Visually check for fluid and water leaks.

5.2.2.6.1. Check for signs of wear, damage, or leakage by looking under vehicle for fluid puddles also look underside engine. Make sure clamps and fittings are tight. Look around engine or underside of engine. Check for any fuel leaks from tanks.

Figure 5.4. Fluid and Water Leaks.



5.2.2.7. Windows and mirrors:

5.2.2.7.1. Windows: Check and inspect windows for damage and dirt; wash off dirt deposits with water. Dry with towel.

5.2.2.7.2. Mirrors: Inspect for broken, dirty, cracked, or loose mirrors. Check for proper alignment, power mirrors, and heated mirrors for proper operation and visibility.

5.2.2.8. Tires.

5.2.2.8.1. Proper inflation.

5.2.2.8.2. Tread to include depth.

5.2.2.8.3. Cuts, gouges, cracks, or other damage.

5.2.2.8.4. Check if valve caps and stems are missing, broken, or damaged.

5.2.2.8.5. Ensure gloves are worn prior to engaging the pintle hook.

5.2.2.9. Inspect fuel tank.

5.2.2.9.1. Check fuel tank for adequate fuel level.

5.2.2.9.2. Remove dirt and debris from tank.

Figure 5.5. Fuel Tank.

5.2.2.10. Armor panels. Inspect the condition of the armor panels for damage, corrosion, paint peeling, blistering and/or combat damage (ensure all nuts and bolts (fasteners) are secure).

Figure 5.6. Armor Panels.

5.2.2.11. Rear ramp.

5.2.2.11.1. Check ramp hinges and mounting hardware.

5.2.2.11.2. Check area under ramp pumps for leaks.

5.2.2.11.3. Check mounting pin and lock pins on ramp pumps.

5.2.2.11.4. Check hydraulic lines from the top of the ramp pump to the reservoir.

5.2.2.11.5. Check ramp door seal for cuts, tears, or missing door seal.

Figure 5.7. Rear Ramp.

5.2.2.12. Ballistic glass.

5.2.2.12.1. Check the ballistic glass for damage.

5.2.2.12.2. Inspect inner surface of ballistic glass and liner.

Figure 5.8. Ballistic Glass.

5.2.2.13. Pintle hook. Check pintle hook for secure mounting and proper operation. Ensure safety latch engages hook lock and safety pin is secure and functional.

5.2.2.14. Fire suppression system (FSS).

5.2.2.14.1. There is one fire suppression system (see **Figure 5.9.**) for the MRAP CAT I with four monitoring areas.

5.2.2.14.2. Press the lamp test button to check the lights on the operation panel.

5.2.2.14.3. Indicator warning light will come ON if a system is being operated or needs repairs.

Figure 5.9. Fire Suppression System.

5.2.2.15. Instrument panel.

5.2.2.15.1. Check all panel gauges and switches.

5.2.2.15.2. Check oil pressure is rising to normal.

5.2.2.15.3. Check voltmeter gauge.

5.2.2.15.4. Check filter restriction gauge.

Figure 5.10. Instrument Panel.

5.2.2.16. Windshield wiper/washing system.

5.2.2.16.1. Check and test wiper washing system.

5.2.2.16.2. Check for worn rubber on blades.

5.2.2.16.3. Ensure blades are securely mounted on wiper arms.

5.2.2.16.4. Check wiper operations.

Figure 5.11. Windshield Wipers.

5.2.2.17. Horn. Check horn operation by turning the ignition switch to ON, turning the lights and depress the horn.

5.2.2.18. Master vehicle light switch:

5.2.2.18.1. Check headlight.

5.2.2.18.2. Check panel dim.

5.2.2.18.3. Check BO drive.

5.2.2.19. Open hood.

5.2.2.19.1. Check coolant level in overflow tank when engine is cold.

5.2.2.19.2. Ensure level is above the cold mark. If coolant is below ADD mark, add coolant to bring it up to MAX level with a 50/50 solution mix

5.2.2.19.3. Check coolant overflow tank and cap for damage and leakage

5.2.2.19.4. Look through plastic reservoir and make sure the fluid is within the minimum and maximum fluid level range as marked on the reservoir. DO NOT remove pressure cap until coolant has cooled.

5.2.2.19.5. Check fuel water separator. Check sediment bowl for water. Equipment is not mission capable (NMC) if any fuel leaks. See **Figure 5.12.**

Figure 5.12. Fuel Water Separator.

5.2.2.20. Check engine oil level.

5.2.2.20.1. With engine off, pull dipstick out and wipe with clean rag.

5.2.2.20.2. Re-insert dipstick to fully seat and pull back out again

5.2.2.20.3. Oil level should be between the FULL and ADD hash marks

5.2.2.20.4. Do not overfill; this will cause the engine to overwork and overheat

5.2.2.20.5. Warning - Cooling system components become pressurized and extremely hot during normal operating. Use extreme care when working around hot components.

Figure 5.13. Engine Oil Level.

5.2.2.21. Power steering:

5.2.2.21.1. Check that the power steering fluid is between the two marks on the white plastic reservoir.

5.2.2.21.2. Check reservoir for leaks, damage, and secure mounting.

5.2.2.21.3. When attempting to refill power steering fluid ensure all dirt around reservoir is wiped away and no loose dirt can fall down into reservoir.

5.2.2.21.4. Check all hoses, connections, cap, and filter for looseness, leaks, and damage.

Figure 5.14. Power Steering.

5.2.2.22. Belts.

5.2.2.22.1. Check all belts for tension (no more than 1/2 inch to 3/4 inch of play when pressed).

5.2.2.22.2. Check all belts for condition, no fraying or cracks.

5.2.2.23. Close and re-secure hood.

5.2.2.24. Seat belts. Inspect belts for proper operation. Make sure the anchor mountings are tight and there is no fraying of seat belt material.

5.2.2.25. Seats. Check and inspect all seats. Be sure seats are firmly engaged to avoid forward or rearward movement when starting or stopping. Make sure that anchor mounting fasteners to the floor, as well as tether straps to floor or cab-back are tight and straps are not worn.

5.2.2.26. Fire Extinguishers. Inspect portable fire extinguisher equipment for any signs of damage or leaks and charge line is the green. Ensure the fire extinguisher is signed-off per installation SOP. Check extinguisher bottle is secure.

Figure 5.15. Fire Extinguisher.

5.2.3. During-operation inspection.

5.2.3.1. Engine/starter:

5.2.3.1.1. Turn ignition to ON, wait for instrument panel to run self-test, turn ignition to start engine. Verify starter engages and engine starts properly.

5.2.3.1.2. Listen for any unusual noises.

Figure 5.16. Engine/Starter.

5.2.3.2. Inspect filter minder gauge on dash for filter element restriction indication.

5.2.3.3. External air tank. The low pressure warning should sound immediately after the engine starts but before the air compressor has built up pressure. The warning should stop after the air pressure reaches 70 psi or more.

5.2.3.4. Check service brake for excessive pedal travel or loss of stopping power.

5.2.3.5. Check for operation of all panel gauges and switches.

5.2.3.6. Check that oil pressure is building to normal.

5.2.3.7. Check the voltmeter gauge to see if the alternator is charging.

5.2.3.8. Check filter restriction gauge to see that it is within acceptable range.

5.2.3.9. Check and test wiper washing system. Check for worn rubber on blades, blades securely mounted on wiper arms, and that wipers work.

5.2.3.10. Perform automatic check of all exterior lights.

5.2.3.10.1. Light switch is ON or ACC position.

5.2.3.10.2. Parking brake is engaged.

5.2.3.10.3. Simultaneously press cruise ON and cruise RESUME and depress and release brake pedal.

5.2.3.10.4. Lights begin to flash in following order: Park, headlights (low and high), right/left front and right/left rear turn signal, and brake lights.

5.2.3.10.5. Check to see that all lights illuminate and are clean.

5.2.3.10.6. Cancel automatic check by pressing the brake pedal, manually turning on any external light, releasing the parking brake, or turning switch to OFF or ON.

5.2.3.11. Check operation of horn by turning the lights on and pressing the horn.

5.2.3.12. Check power steering by turning the steering wheel to ensure no binding occurs.

5.2.3.13. Check transmission for smooth shifting through gears.

5.2.3.14. Check four-wheel drive by checking for proper shifting in and out of four-wheel drive.

Figure 5.17. Crew Light/Rear Ramp Light Switches.

5.2.4. After-operation inspection.

5.2.4.1. Cleanliness/damage/missing items (always keep the vehicle clean inside and out).

5.2.4.2. All wheel rims (cracks, splits, etc.); check for loose or missing lug nut.

5.2.4.3. Welds; check for loose or chipped paint, rust or gaps.

5.2.4.4. Visually check for fluid and water leakage.

5.2.5. A Seven-Step Inspection Method will help ensure the inspection is the same each time it is conducted, and that nothing is left out. See **Attachment 4** for the Seven-Step Inspection Method.

5.2.6. Types of Vehicle Inspection. If discrepancies are found they must be reported to the Vehicle Control Official (VCO), the supervisor, and/or vehicle maintenance:

5.3. Vehicle Safety and Equipment.

5.3.1. Types of common mishaps include:

5.3.1.1. Bruises, head injuries, cuts and lacerations to personnel. Personnel must wear head protection while travelling in the MRAP.

5.3.1.2. Fatalities due to rollovers.

5.3.2. Hazards and human factors:

5.3.2.1. Jerky starts and stops.

5.3.2.2. Failure to give proper signals when turning.

5.3.2.3. Traveling too fast and turning too sharply.

5.3.2.4. Failure to release parking brake before traveling.

5.3.2.5. Failure to use a spotter in difficult areas/situations. Spotters must be trained and use hand signals IAW AFMAN 24-306.

5.3.2.6. Rollover risk.

5.3.3. Safety clothing and equipment:

5.3.3.1. Safety steel-toed boots must be worn.

5.3.3.2. Head protection, as required.

5.3.3.3. Raingear, cold weather gear, etc.

5.3.3.4. Reflective belt during hours of reduced visibility.

5.3.3.5. Hearing protection/eye protection.

5.3.3.6. Hand protection, as required.

5.3.3.7. Tire gauge.

5.3.3.8. Fire extinguisher.

5.4. Driving Safety and Precautions.

5.4.1. Operator is responsible for safety of personnel riding in vehicle. Operator will not move vehicle if any passenger is in an unsafe position or vehicle has too many passengers.

5.4.2. Ensure personnel protective equipment is on. Identify and understand cautions and warning listed in the operator's manual and vehicle to prevent serious injury/death to personnel or damage to the vehicle.

5.4.3. Secure all cargo and/or equipment inside of the vehicle prior to operation.

5.4.4. Never start or operate the MRAP from any other place than the Operator's seat. Passengers will ride in the provided seat. Always keep all body parts inside the vehicle, unless up in the turret.

5.4.5. Always monitor gauges during vehicle operation. Do not ignore warning lights or audible alarms.

5.4.5.1. If oil pressure, air pressure, engine temperature, or transmission temperature exceed the maximum or drop below the minimum range, stop the vehicle in a safe place as soon as the tactical situation permits.

5.4.5.2. If CHECK TRANSMISSION light turns on during vehicle operation, shifting may become restricted.

5.4.6. Engage or disengage differential locks as required for operating conditions.

5.4.7. Make absolutely certain that the gunner's hatch is completely locked in the open position before moving the vehicle with a gunner in position.

5.4.8. Never drive the vehicle up to anyone standing in front of an object. Make certain (by looking out one of the small rear windows) that no one is behind the vehicle when lowering the rear door/ramp. DO NOT operate the rear door/ramp when the vehicle is in motion. Use extreme caution when using the emergency rear door/ramp release to ensure that no one can be struck by the door as it falls open. Keep arms and legs clear of rear door/ramp when closing it. **Note:** Failure to comply may result in serious injury or death to personnel.

5.4.9. Before opening hood, make sure that there is enough room in front of the vehicle for the hood to open completely without being pinned or pinched or pinning or an assistant between the hood and any other structure. **Note:** Failure to comply may result in serious injury or death.

5.4.10. DO NOT use steering wheel for hand grip to enter vehicle. Use of steering wheel for hand grip may cause sudden violent jerking of the vehicle. When entering or exiting cab, use three-point contact system.

5.4.11. DO NOT operate vehicle with air pressure system loss; this is extremely dangerous. Vehicle has reduced or no braking capability and may not stop. **Note:** Failure to comply may result in damage to equipment and/or serious injury or death to personnel.

5.4.12. DO NOT disconnect any airline or fitting until system pressure has been relieved. Air under pressure can penetrate the skin.

5.4.13. Ensure master power switches on both vehicles are OFF prior to connecting NATO slave cables or before performing battery or other electrical maintenance. **Note:** Failure to comply may result in serious injury or death to personnel.

5.4.14. All snow and ice must be removed from the vehicle as soon as possible. Snow and ice may slow or stop movement of crucial parts.

5.4.15. If operator leaves the vehicle, even momentarily, when engine is running, the transmission MUST be in neutral N; parking brake must be set and engaged, and wheels MUST be chocked.

5.4.16. The vehicle must be completely stopped with the service brake applied before shifting between rear wheel and four-wheel drive, or to shift range in either mode. Failure to comply may result in damage to equipment.

5.4.17. Do not direct high-pressure water stream at seals, air intake, exhaust outlet, radiator, condenser or other components of vehicle that could be easily damaged by high-pressure water stream. Failure to comply may result in damage to the driveline.

5.4.18. Do not use first gear to move vehicle if the tires are frozen to the ground or if the brakes are frozen to the drums. Failure to comply may result in damage to the driveline.

5.4.19. Rollover risk warning. The potential for a vehicle to rollover increases for vehicles with a high gross weight (20,000 lbs. or more) or a high center of gravity. Check the vehicle's data plate to determine if the vehicle is at higher risk for rollover.

5.4.20. Do not attempt to tow or push start the MRAP.

5.4.21. If the start/run switch is in the RUN position, but the engine has not started, this will drain the battery.

5.4.22. Do not operate the starter for more than 20 seconds.

5.4.23. If any instrument reading is not normal during-operation, turn-off the engine.

5.4.24. During jump starting procedures, use only approved M-series jumper cables (slave cable).

5.4.25. Be alert at all times during vehicle operation for exhaust odors, do NOT operate vehicle in enclosed area. Be alert for excessive exhaust fumes when backing the vehicle.

5.4.26. Turn-off all radios within 50 feet of any refueling operation.

5.4.27. Ensure cell phones are turned-off prior to operation of vehicle and during fueling operations.

5.4.28. Off Road driving. All MRAPs are designed for use over all types of roads, in all weather conditions and the most difficult terrain. The MRAPs high power-to-weight ratio, four-wheel drive, and high-ground clearance combined to give it outstanding cross-country mobility. Operators should use extreme caution when driving in unusual/unknown terrain. Road shoulders can give way, unexpected objects in the road can cause the operator to serve or lose control. Situational awareness can reduce the chance of driving or slipping into canals/ditches. See AFMAN 24-306 for additional guidance.

5.4.29. Transition a slope IAW manufacturer's operator's manual recommended guidance. The MRAP is a high center of gravity vehicle and is susceptible to rollover. Transitioning a side slope at the appropriate angle and using safe operation is necessary to prevent injury and equipment damage.

5.4.29.1. Rocky terrain.

5.4.29.1.1. Do not try to straddle large boulders; they will damage axles and other low parts of the vehicle. Move slowly over when driving in rocky terrain.

5.4.29.2. Mud and swamps.

5.4.29.2.1. Try to pull out of the mud/swamp slowly in low gear if the vehicle is equipped with an automatic transmission. Place boards, brush, or similar material under the vehicle's wheels can increase traction.

5.4.29.2.2. Roll onto the soft area at a medium speed for the selected gear. Carefully maintain a steady throttle until reaching solid ground.

5.4.29.2.3. If the vehicle is in an automatic, try to pull out slowly by switching to a lower gear. If this or using boards or brush does not work, try to have another vehicle pull the vehicle out.

5.4.29.3. Ditches.

5.4.29.3.1. Cross shallow ditches by shifting into low gear or range and proceeding slowly. Enter the ditch at an angle so that one wheel leaves the ditch as the other wheel on the same side enters it.

5.4.29.4. Gullies and ravines.

5.4.29.4.1. Find a place to enter that is easy access and easy to get across. Put the vehicle in low gear and slowly approach the ravine at a right angle to the edge. Using the foot brake, ease the front wheels into the gully; make sure they hit at the same time. Bring the engine up to a normal speed before the wheels hit the bottom. Accelerate just enough to climb so that the front wheels touch the opposite bank.

5.4.29.5. Slippery conditions.

5.4.29.5.1. Vehicle operation in slippery conditions is hazardous. The MRAP is equipped with ABS but it cannot provide any better braking and steering capability than available road traction will permit. Operator must travel at reduced speeds and be prepared to meet sudden changes in road conditions.

5.4.29.5.2. Failure to maintain safe stopping distances will cause damage to vehicle and/or injury or death to personnel.

5.4.29.5.3. Apply service breaks sooner and press service brake pedal lightly to give early warning to any vehicles that may be following.

5.4.29.5.4. After driving through slush or water, drive slowly and test service brakes.

5.4.29.5.5. To dry out brake shoes and drums, lightly press and hold service brake pedal for 5 to 10 seconds at a time while lightly applying throttle.

5.4.29.5.6. Chock blocks shall be used when parking a vehicle in extreme cold conditions. Failure to do so may result in injury to personnel or damage to equipment.

5.4.30. Rollovers.

5.4.30.1. During a vehicle rollover, the senior occupant will ensure that ALL personnel are checked for injuries and that injured personnel are given the appropriate medical attention. Report the accident immediately along with injury report.

5.4.30.2. Rollover procedures:

5.4.30.2.1. The first individual to notice a vehicle beginning to rollover will shout, “ROLLOVER!”

5.4.30.2.2. The operator will release the accelerator, keep hands on steering wheel with extended, but not locked arms, tuck head in to chest and brace for impact and yell, “ROLLOVER!”

5.4.30.2.3. The passenger(s) will tuck their head(s) into chest and brace for impact. He/she will plant feet firmly on the floor while holding on to a stationary object and yell, “ROLLOVER!”

5.4.30.2.4. The gunner will drop down. He/she will tuck head into chest and brace for impact. He/she will plant feet firmly on the floor while holding on to a stationary object and yell, "ROLLOVER!"

Note: Gunners operating the turret should limit body protrusion not to exceed the name tape.

5.4.31. Braking safety.

5.4.31.1. Braking without airbrakes.

5.4.31.1.1. Speed and stopping distance. There are three things that add up to total stopping distance:

5.4.31.1.2. Perception Distance + Reaction Distance + Braking Distance = Total Stopping Distance.

5.4.31.1.3. Perception distance. This is the distance the vehicle moves from the time the operator's eyes see a hazard until their brain knows it. The perception time for an alert driver is about 3/4 second.

5.4.31.1.4. Reaction distance. The distance traveled from the time the operator's brain tells their foot to move from the accelerator until their foot is actually pushing the brake pedal. The average driver has a reaction time of 3/4 second. This accounts for an additional 60 feet traveled at 55 mph.

5.4.31.1.5. Braking distance. The distance it takes to stop once the brakes are put on. At 55 mph on dry pavement with good brakes, it can take a heavy vehicle about 170 feet to stop (about 4 3/4 seconds).

5.4.31.1.6. Total stopping distance. At 55 mph it will take about 6 seconds to stop and the vehicle will travel about the distance of a football field (60 + 60 + 170 = 290 feet).

5.4.31.2. Braking distance with air brakes.

5.4.31.2.1. With air brakes there is an added delay: the time required for the brakes to work after the brake pedal is pushed. Thus, the total stopping distance for vehicles with air brake systems is made up of four different factors:

5.4.31.2.1.1. Perception Distance + Reaction Distance + Brake Lag Distance + Effective Braking Distance = Total Stopping Distance.

5.4.31.2.2. The air brake lag distance at 55 mph on dry pavement adds about 32 feet. So at 55 mph for an average driver under good traction and brake conditions, the total stopping distance is over 300 feet. This is longer than a football field.

5.4.31.3. Control and stopping requirements.

5.4.31.3.1. The service brake must hold the vehicle on any grade on which it is operated under all conditions of loading or unloading.

5.4.31.3.2. The service brakes of every motor vehicle must be capable of stopping from an initial speed of 20 miles per hour and is measured in feet as maximum stopping distance (MSD).

5.4.31.3.3. For a vehicle with a gross vehicle weight rating (GVWR) of 10,000 lbs. or more the MSD is 40 feet.

5.4.31.4. Effects of speed on stopping distance.

5.4.31.4.1. When the speed of the vehicle is doubled, it will take about four times the distance to stop, and the vehicle will have four times the destructive power if it crashes.

5.4.31.4.2. High speeds increase stopping distances greatly. By slowing down a little, the Operator can gain a lot in reduced braking distance.

5.4.32. Tire changing procedures. In the event that the vehicle should have a flat or damaged tire, the trainee must know the following procedures for properly and safely changing the tire:

5.4.32.1. Equipment/tools:

5.4.32.1.1. Vehicle jack w/jack handle rated for weight of vehicle.

5.4.32.1.2. Lug wrench.

5.4.32.1.3. Jack stand.

5.4.32.1.4. Wheel chocks.

5.4.32.1.5. Hand/eye/hearing protection (if pneumatic tools are going to be used).

5.4.32.2. Tire changing steps:

5.4.32.2.1. Use gloves when handling and lifting tires.

5.4.32.2.2. Ensure the vehicle is seated on a level surface.

5.4.32.2.3. Chock the adjacent drive wheel.

5.4.32.2.4. Locate solid part of the vehicle’s frame.

5.4.32.2.5. Place the vehicle jack under the vehicle’s frame as close as possible that will not impede the tire removal and/or replacement.

5.4.32.2.6. Raise the vehicle with the jack until the vehicle's weight is supported on the jack, but the tire is still in contact with the ground.

5.4.32.2.7. Loosen, DO NOT, remove the lug nuts.

5.4.32.2.8. Raise the vehicle up until the tire clears the ground with no more than an extra inch to allow replacement of the tire.

5.4.32.2.9. Place the jack stand under the frame of the vehicle to support the vehicle in the case that the jack's hydraulics should leak and/or fail.

5.4.32.2.10. Remove the wheel's lug nuts.

5.4.32.2.11. Remove the vehicle's flat/damaged tire using two personnel.

5.4.32.2.12. Place the replacement tire onto the vehicle's axle using two personnel.

5.4.32.2.13. Replace the vehicle's lug nuts (to hand tightness).

5.4.32.2.14. Jack the vehicle up and remove the jack stand.

5.4.32.2.15. Lower the vehicle until the wheel makes contact with the ground to prevent the tire from spinning during tightening, DO NOT put the entire vehicle weight on the wheel until after the next step.

5.4.32.2.16. Tighten vehicle's lug nuts in a star pattern to ensure proper seat of the wheel to the axle.

5.4.32.2.17. Lower the jack stand completely and remove from under the vehicle.

Note: Tighten loose lug nuts. Have vehicle maintenance tighten the stud nuts and lug nuts to the proper torque found in the manufacturer's operator's manual.

5.4.33. Winch safety.

5.4.33.1. When recovering the cable, recovery takes time, do not hurry. A broken winch line reacts like a whip, when hooking to a vehicle, use both shackles whenever possible so effort is applied equally and damage to the vehicle in minimized.

5.4.33.2. Never bend the wire cable at a sharp angle.

5.4.33.3. Straighten out all the kinks and twists while taking up the slack.

5.4.33.4. Stand clear of the winch cable before it is tightened. A cable being tightened may break and whip back causing serious bodily harm or even death.

5.4.33.5. After using the winch, have one person or preferably two pull back on the cable while it is wound slowly and even on the drum. Keep the cable lubricated according to the manual.

5.5. Vehicle Operation.

5.5.1. Starting procedures.

5.5.1.1. Ensure that the MRAP is in the neutral position. Apply parking brake.

5.5.1.2. Adjust the driver's seat and outside mirrors.

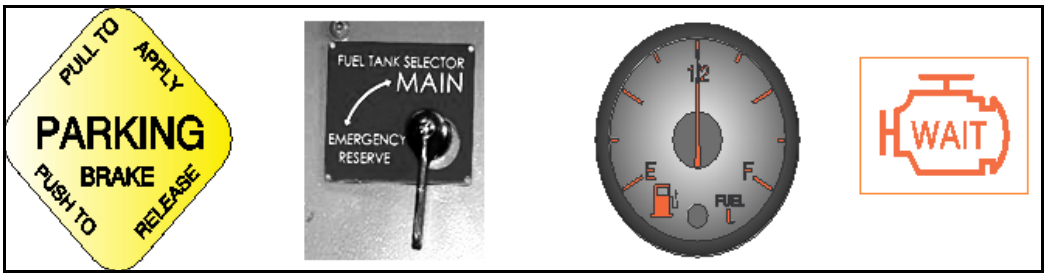
5.5.1.3. Fasten safety belt, removing all slack out of the belt for proper use.

5.5.1.4. Check position of fuel indicator switch.

5.5.1.5. Check fuel gauges.

5.5.1.6. Check that WAIT TO START warning indicator on the warning panel is not lit. See **Figure 5.18.**

Figure 5.18. Warning Panel.



5.5.1.7. Press accelerator lightly and move ignition switch to START. See **Figure 5.19.**

5.5.1.8. Push ignition switch UP until engine starts, release.

5.5.1.9. Switch will move to RUN.

5.5.1.10. For temperatures > 60°F, keep foot off accelerator while cranking. See **Figure 5.20.**

5.5.1.11. For temperatures <60°F, full depress accelerator after engaging the starter.

Figure 5.19. Ignition Switch.

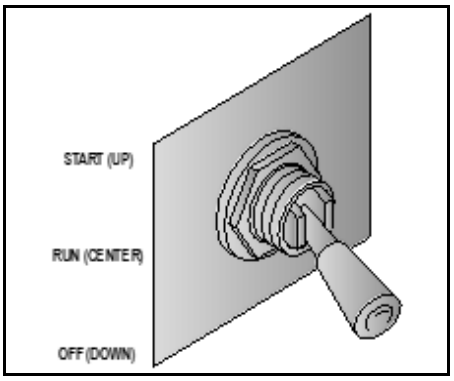
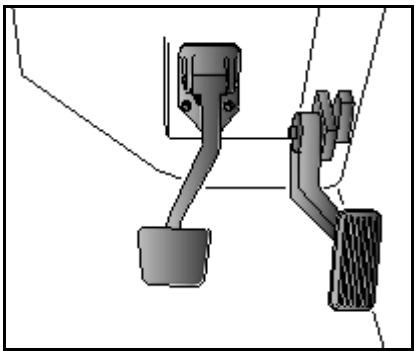


Figure 5.20. Accelerator.



Note: Do not overtax the starter or battery. Do not crank the starter for more than 20 seconds at a time. Wait at least 10-15 seconds between attempts.

5.5.1.12. Allow the engine to reach operating temperature prior to moving the vehicle (unless there is an emergency situation).

5.5.1.13. If at this point the engine will not start, refer to the manufacturer's operator's manual for the troubleshooting section.

5.5.1.14. After engine has warmed up and air tanks have reached 130 psi, press brake pedal and listen for an audible leak. Press the YELLOW push-pull switch and place the vehicle in the desired driving position (RED push-pull switch is for trailer use only).

5.5.1.15. To turn on the lights; press the "Serv. Drive" button, then press "Enter" while flashing until light illuminates and stays steady. Use the same step for parking lights only.

5.5.1.16. To turn BO lights on; press the "B.O. Drive" button then press "Enter" while flashing until light illuminates. Use same step for B.O. marker lamps.

5.5.1.17. To turn any light system off, press the "All Off" button then press "Enter" while flashing until no lights are visible.

5.5.1.18. Check steering for excessive play.

5.5.1.19. Test horn. **Note:** Horn will not operate unless the service drive button is activated.

5.5.1.20. Check windshield wipers and washers.

5.5.2. Automatic transmission control. The MRAP automatic transmission has neutral (N), reverse (R) and five forward gear positions.

5.5.2.1. Neutral. The transmission resets itself to neutral when the engine is shut-off. This position can be used if the vehicle stalls, in order to restart the vehicle. Always ensure the vehicle has the parking brake set when using neutral.

5.5.2.2. Reverse. The vehicle needs to be at a complete stop prior to shifting to reverse to avoid damage to the transmission. Due to the extreme visibility constraints associated with the MRAP, always use a spotter when backing.

5.5.2.3. Abuse protection. The transmission has built in protections against several types of abuse.

5.5.2.3.1. The transmission will not shift from N to D to R if the drive shaft is moving.

5.5.2.3.2. The transmission will not shift from N into (F) or R UNLESS the service brake is applied.

5.5.2.3.3. When a lower gear is selected the transmission will not shift to that gear until the vehicle slows to the speed range allowed for that gear.

5.5.2.3.4. The transmission always shifts up or down through the gears sequentially.

5.5.2.3.5. If R is pressed while the vehicle is moving, the transmission gear indicator window will flash R.

5.5.2.3.6. If the vehicle comes to a stop within 3 seconds, the transmission gear indicator will shift into R and the flashing will stop.

5.5.2.3.7. If the vehicle does not come to a stop within 3 seconds, the shift request will be ignored and the last drive number will be displayed.

5.5.2.3.8. If D is pressed while the vehicle is moving backward, the transmission gear indicator window will flash D.

5.5.2.3.8.1. If the vehicle comes to a stop within 3 seconds, the transmission gear indicator will shift into D and the flashing will stop.

5.5.2.3.8.2. If the vehicle does not come to a stop within 3 seconds, the shift request will be ignored and R or N will be displayed on the transmission shift pad.

5.5.2.3.8.3. If D is pressed while moving forward in any gear, the left digit on the transmission shift pad will display 5.

5.5.2.3.9. When IGNITION switch is moved to RUN position, the transmission shift pad displays N. See **Figure 5.21.** and **Figure 5.22.**

Figure 5.21. Ignition Switch.

Figure 5.22. Digital Display.

5.5.2.4. Digital display.

5.5.2.4.1. Direction of travel. Press R or D on the transmission shift pad to choose direction of travel. See **Figure 5.23.** below.

5.5.2.4.2. Shift into neutral N whenever prolong idling is anticipated.

5.5.2.4.3. The drive D ranges includes five forward gears.

5.5.2.4.4. When idling with D selected, first gear is engaged. Digital Display Panel will display the number 5 in the left position and one in the right position. See **Figure 5.23.**

Figure 5.23. Direction of Travel.

5.5.2.4.5. At each shift the number in the right position will change to display the actual gear that the transmission is operating in.

5.5.2.4.6. **Figure 5.24.** shows an example of transmission gear ratios and the maximum speed for each gear. Refer to the manufacturer's operator's manual for the specific MRAP type/model being operated.

Figure 5.24. Transmission Gear Rations and Maximum Speed (varies by MRAP type/model).

Range	Ratio	Max Speed Low Range	Max Speed High Range
1st Gear	4.59:1	5 mph (8 kph)	12 mph (19 kph)
2nd Gear	2.26:1	10 mph (16 kph)	24 mph (38 kph)
3rd Gear	1.53:1	15 mph (24 kph)	36 mph (58 kph)
4th Gear	1:1	22 mph (35 kph)	55 mph (88 kph)
5th Gear	0.75:1	30 mph (408 kph)	68 mph (109 kph)
Reverse	5:1	5 mph (8 kph)	11 mph (17 kph)

5.5.3. Manual shifting. The automatic transmission can be manually shifted by pressing the up or down arrows on the transmission shift control pad. See **Figure 5.25.**

Figure 5.25. Manual Shifting.

5.5.3.1. If the vehicle exceeds the maximum speed for a lower gear, use the brakes to slow vehicle until shift occurs.

5.5.3.2. If the vehicle is moving slower than the minimum speed for a higher gear, accelerate to increase speed until the shift occurs.

5.5.3.3. The transmission will stay in the specific gear so long as the vehicle is at programmed speed range.

5.5.3.4. If the vehicle exceeds the programmed range, the transmission will upshift and the right digit in the display will change to indicate actual gear.

5.5.3.5. If the vehicle speed is below the programmed range, the transmission will downshift and the right digit in the display will indicate the actual gear.

5.5.3.6. When the vehicle is operating in a manually selected low gear, there are two ways to move to higher gears:

5.5.3.6.1. The up arrow will move the transmission up one gear at a time. Shifting will occur at programmed engine speed and load.

5.5.3.6.2. Pressing D on the selector pad will return transmission top gear range to fifth gear. Transmission will shift through the gears according to programmed parameters.

5.5.4. Standard operating mode.

5.5.4.1. Rear wheel drive vehicle under normal conditions.

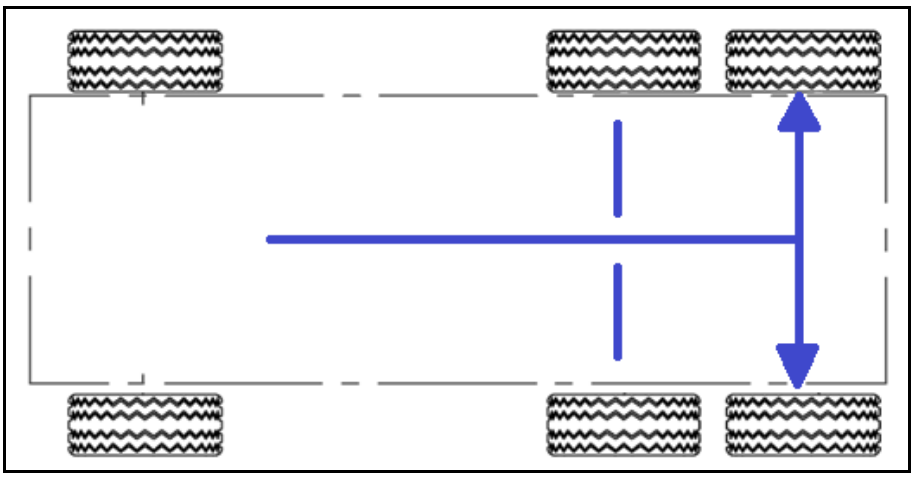
5.5.4.2. Only rear wheels power vehicle.

5.5.4.3. Transfer Case delivers power to center axle.

5.5.4.4. Driveshaft transfers power to rear axle. See **Figure 5.26.**

5.5.4.5. Suitable for most road travel.

Figure 5.26. Standard Operating Mode.



5.5.5. All-wheel drive (AWD). **Note:** Caution –Stop to shift in or out of AWD. Limit speed to less than 25 mph when operating off-road or in inclement conditions.

5.5.5.1. AWD overview:

5.5.5.1.1. Transfer case delivers power to front and center axle.

5.5.5.1.2. Front differential alternates torque to LH and RH wheels.

5.5.5.1.3. Torque applied to one wheel on center axle and diagonally opposite wheel on rear axle.

5.5.5.2. To engage AWD:

5.5.5.2.1. Stop vehicle.

5.5.5.2.2. Press top of AWD switch.

5.5.5.2.3. LED may not illuminate the AWD switch until the vehicle moves forward.

5.5.5.2.4. Vehicle will operate normally and cycle through all 5 gears.

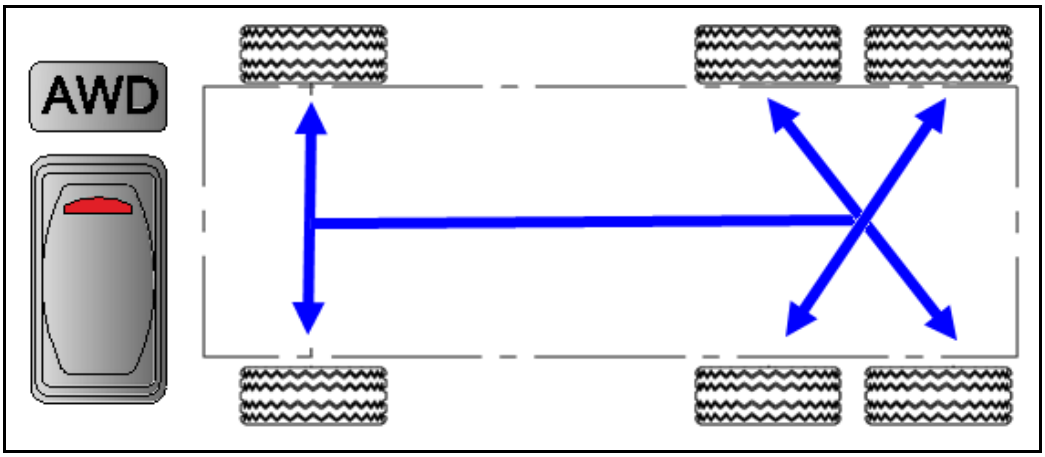
5.5.5.3. To disengage AWD:

5.5.5.3.1. Stop vehicle to shift out of AWD.

5.5.5.3.2. Press bottom of AWD switch.

5.5.5.3.3. The AWD LED will go out after the vehicle has traveled 15 ft. **See Figure 5.27**.

Figure 5.27. All-Wheel Drive (AWD).



5.5.6. Six-wheel drive (6WD). See **Figure 5.27.**

5.5.6.1. 6WD overview.

5.5.6.1.1. Provides maximum traction for traversing irregular or hazardous terrain.

5.5.6.1.2. Differential on each axle is locked to deliver equal power to both wheel ends.

5.5.6.1.3. Transmission range limited to two lowest gears.

5.5.6.2. To engage six-wheel drive.

5.5.6.2.1. Stop the vehicle to shift into six-wheel drive.

5.5.6.2.2. Press top of both the AWD and DIF lock switches.

5.5.6.2.3. LED on both the AWD and DIF LOCK switches will illuminate after the AWD and differential are engaged.

5.5.6.2.4. Driver should limit speed limit to less than 24 mph.

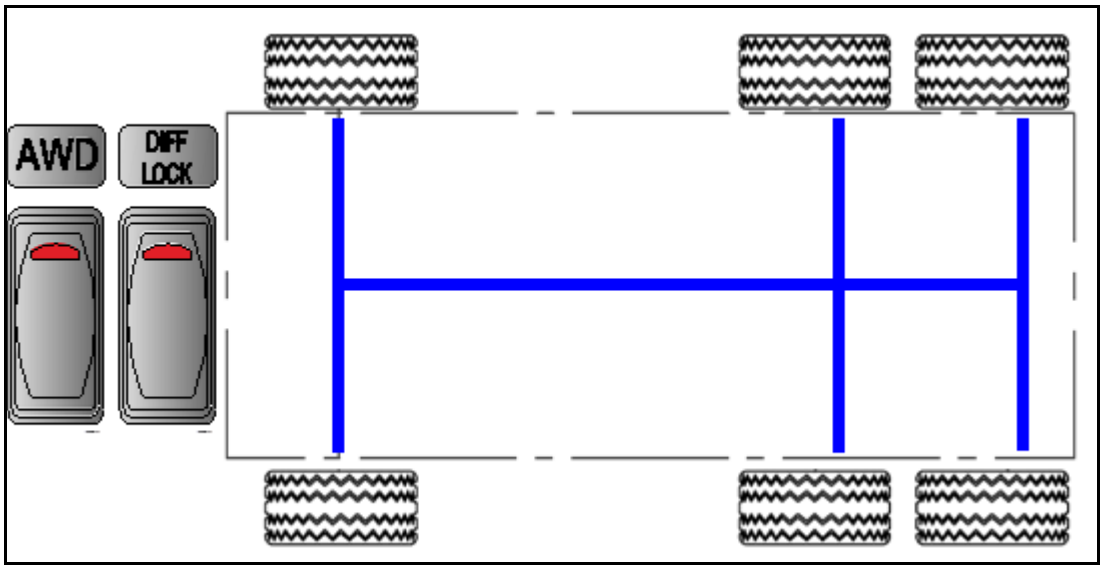
5.5.6.3. To disengage 6WD.

5.5.6.3.1. Stop the vehicle to shift out of six-wheel drive.

5.5.6.3.2. Press bottom of both the AWD and DIF LOCK switches.

5.5.6.3.3. The AWD and DIF LOCK LED's will go out after the vehicle has traveled forward.

Figure 5.28. Six-Wheel Drive (6WD).

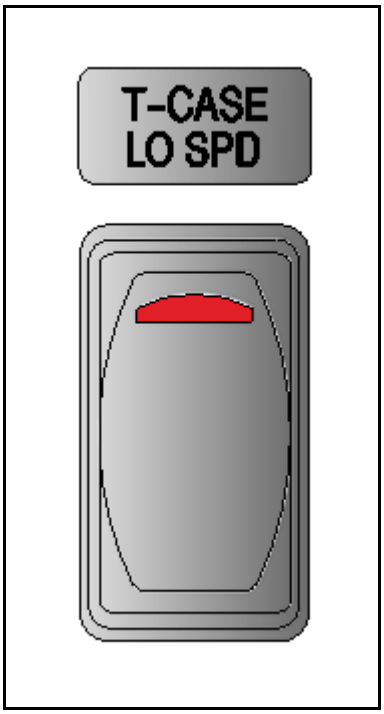


5.5.7. Transfer case low range operation.

5.5.7.1. Transfer case switch used to lock transmission in low gear and prevents any shifting.

5.5.7.2. Only as a “get home” strategy in an emergency situation.

Figure 5.29. Transfer Case Low Range Operation.



5.5.7.3. Stop the vehicle to engage transfer case low range.

5.5.7.4. Press top of the TCASE LP SPD switch to shift the transfer case into low range.

5.5.7.5. The red LED lights up after the vehicle moves forward.

5.5.7.6. Stop the vehicle to shift out of transfer case low range.

5.5.7.7. Press bottom of the TCASE LO SPD switch to shift the transfer case to low range.

5.5.7.8. Shift transmission to N and wait to feel transmission release.

5.5.7.9. Shift the transmission to D.

5.5.7.10. The transfer LED will turn off after the vehicle has traveled forward.

5.5.8. Controlling vehicle.

5.5.8.1. The MRAP is steering a conventional manner.

5.5.8.2. Place light control switch in appropriate position.

5.5.8.3. Use dimmer switch to control brightness of the panel lighting.

Figure 5.30. Controlling the Vehicle Control Switches.

Table 5.3. Vehicle Control Switches.

Control	Function
Off	Turns all lights off
IR	Front Bumper IR Lights on.
BO	Exterior blackout marker and drive lights on.
MRKR	The sidemarkers lights on.
HDLP	Normal night time driving lights.

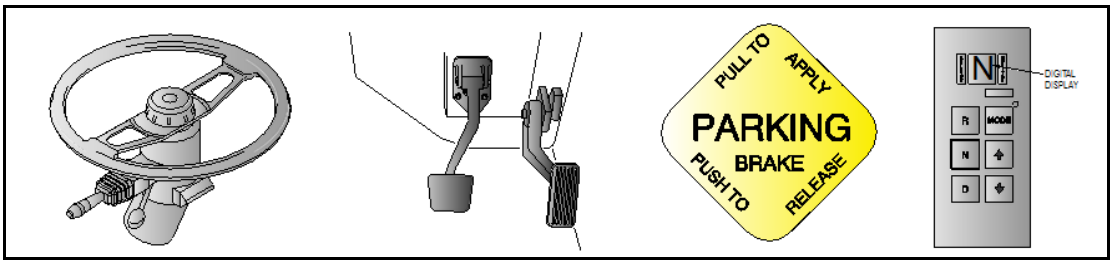
5.5.8.4. Press center of steering wheel to sound horn.

5.5.8.5. Press and hold foot brake.

5.5.8.6. Release parking brake.

5.5.8.7. Select desired gear (D or R) on transmission selector pad. See **Figure 5.31.**

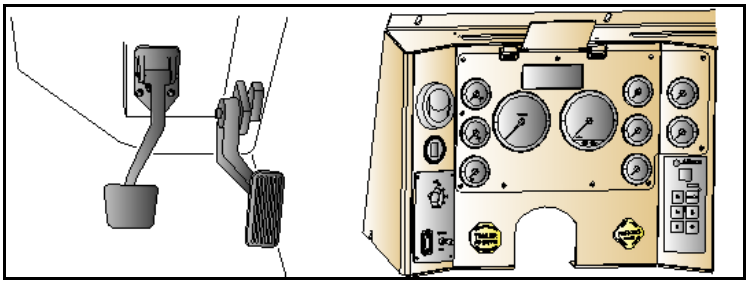
Figure. 5.31. Controlling the Vehicle (1/3).



5.5.8.8. Release brake pedal and press accelerator pedal.

5.5.8.9. Regularly check gauges, light indicator panel, and transmission display for problems. See **Figure 5.32**.

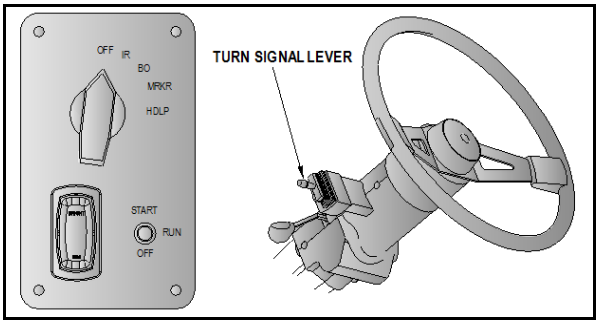
Figure 5.32. Controlling the Vehicle (2/3).



5.5.8.10. When operating at night, use the lighting control switch to turn on headlights.

5.5.8.11. Use the bright light control on the turn signals to turn bright lights on and off as needed. See **Figure 5.33.**

Figure 5.33. Controlling the Vehicle (3/3).



5.5.9. Stopping vehicle.

5.5.9.1. The service brakes are air operated and controlled by an antilock braking system.

5.5.9.2. Braking action is similar to automobile brakes. However, the driver cannot feel braking force through the service brake pedal pressure.

5.5.9.3. The distance the pedal is depressed determines the braking force applied by the air brake system. The resistance felt by the driver is the same whether the brake is gently applied or fully engaged in a full emergency stop.

5.5.9.4. Press brake pedal to apply brakes. Transmission will downshift automatically.

5.5.9.5. Exhaust brake. The MRAP is equipped with an exhaust brake which operates by closing a butterfly valve within the exhaust system just after the turbocharger. This creates back pressure on the engine and drive train and inhibits power production.

5.5.9.5.1. Do not use the exhaust brake in rain or any other slippery conditions. Use of the exhaust brake under these conditions may cause skidding and possible loss of vehicle control.

5.5.9.5.2. When using the exhaust brake, the brake lights do not illuminate. An accident may occur if another vehicle is closely following and does not realize the vehicle is braking.

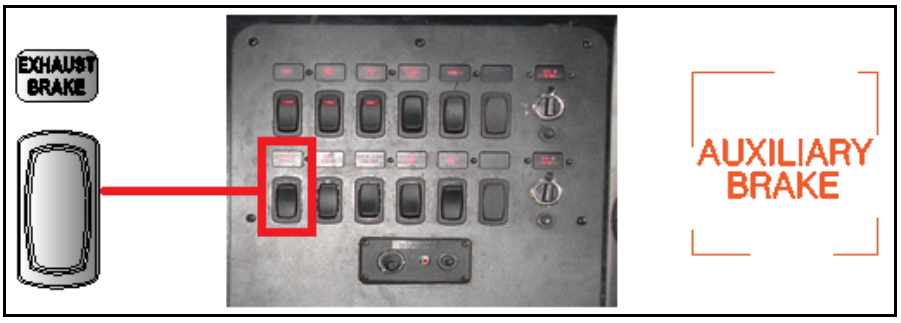
5.5.9.5.3. To activate the exhaust brake:

5.5.9.5.3.1. Press the top of the Exhaust Brake rocker switch.

5.5.9.5.3.2. Easing off of the accelerator activates the exhaust brake.

5.5.9.5.3.3. The AUXILIARY BRAKE warning light on the light panel turns on. See **Figure 5.34.** below.

Figure 5.34. Exhaust Brake/Light Panel.



5.5.9.5.4. To disengage exhaust brake:

5.5.9.5.4.1. Exhaust brake should not be disengaged while brakes are being applied.

5.5.9.5.4.2. Press bottom of EXHAUST BRAKE switch to turn it off. See **Figure 5.34.**

5.5.9.6. The ABS system will turn off the exhaust brake automatically when necessary to maintain braking control.

5.5.9.7. If air pressure is lost. Air brakes will revert to the BRAKE condition, in which springs will apply braking force.

5.5.9.8. For complete brake failure emergencies, turn on the exhaust brake and downshift transmission.

5.5.10. Reversing vehicle.

5.5.10.1. Bring vehicle to a complete stop.

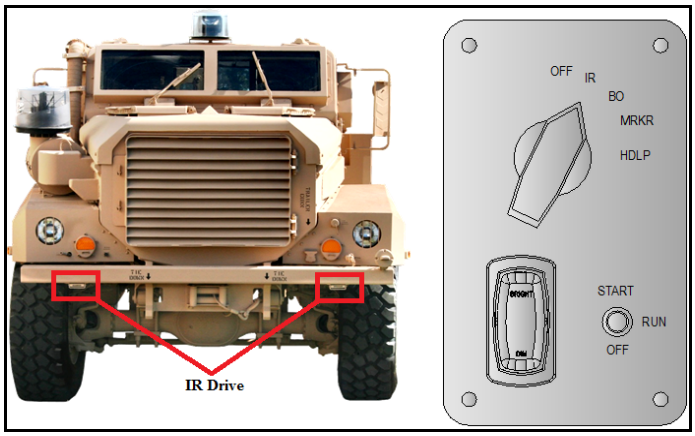
5.5.10.2. While holding brake pedal, press the neutral N button on the shift control panel.

5.5.10.3. Press the reverse R button on the shift control panel.

5.5.10.4. Press accelerator pedal.

5.5.11. Infrared mode. See **Figure 5.35**.

Figure 5.35. Infrared Mode.



5.5.11.1. Turn knob on lighting control panel to IR.

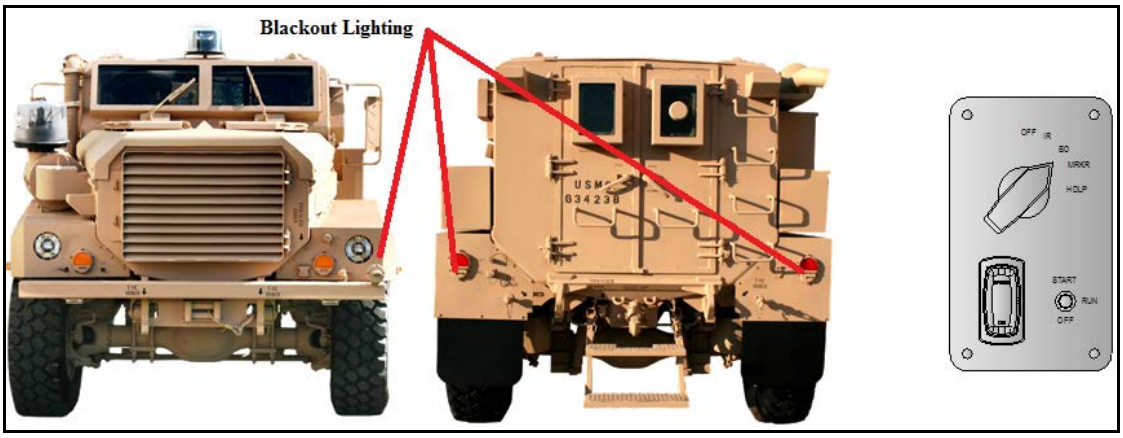
5.5.11.2. Only the IR lights will operate in this mode.

5.5.11.3. Flip the warning light panel cover down.

5.5.11.4. To return to normal operations, turn knob on lighting control panel to appropriate lighting scheme. See **Figure 5.36**.

5.5.12. BO operations. See **Figure 5.37.**

Figure 5.37. Blackout Operations.



5.5.12.1. Turn the knob on the lighting control panel to BO.

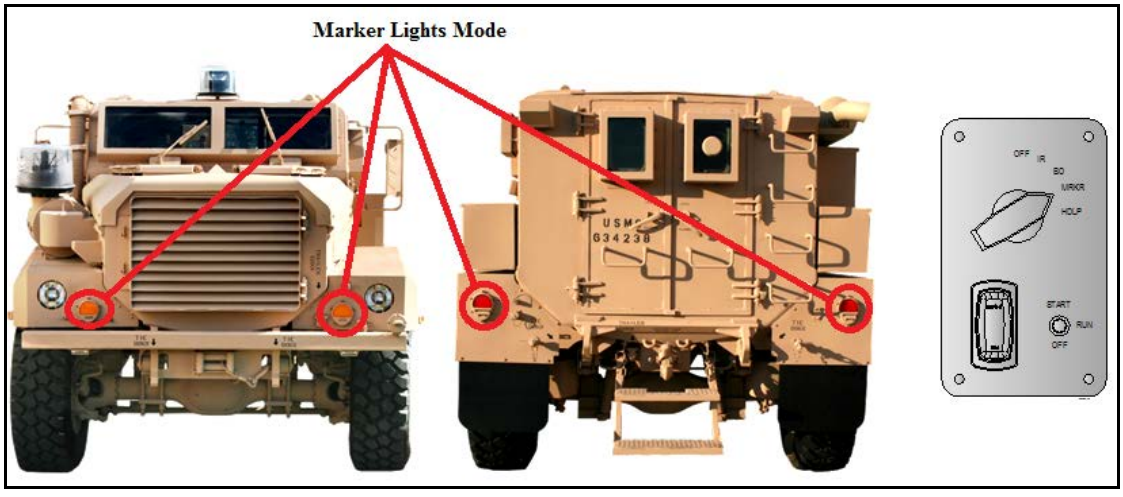
5.5.12.2. The BO lighting will provide some illumination for reading or other tasks.

5.5.12.3. Flip the warning light cover panel into place over the display. See **Figure 5.37**.

5.5.12.4. The dash backlighting is infrared and will operate normally under BO conditions.

5.5.13. Marker lights mode. See **Figure 5.38**.

Figure 5.38. Marker Lights Mode.



5.5.13.1. Turn the knob on the lighting control panel to MRKR.

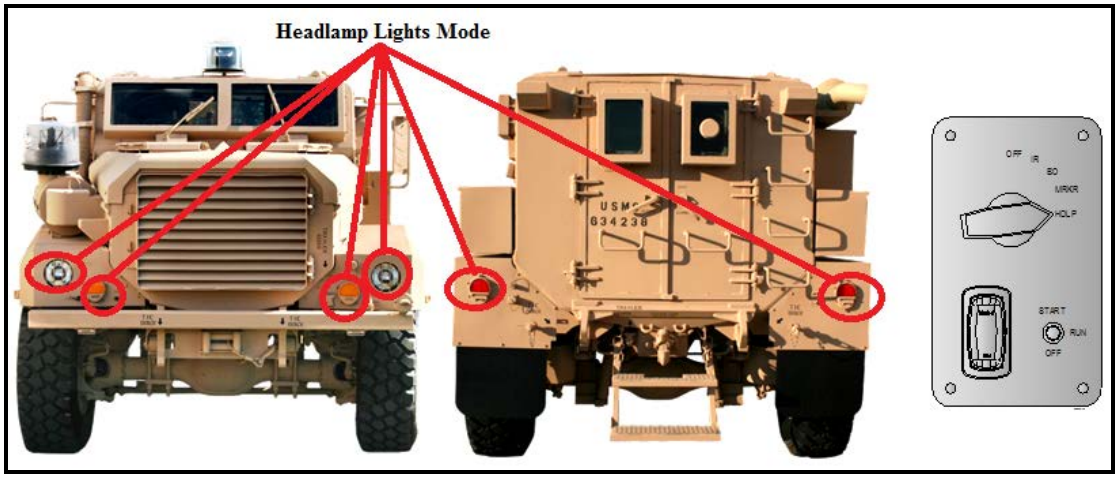
5.5.13.2. The marker lights mode switch turns on the front and back marker (parking) lights.

5.5.13.3. The dash backlighting will operate normally under Marker Light conditions.

5.5.13.4. The compartment lights will also operate normally.

5.5.14. Headlamp lights mode. See **Figure 5.39**.

Figure 5.39. Headlamp Lights Mode.



5.5.14.1. Turn the knob on the lighting control panel to HDLP.

5.5.14.2. The headlamp lights mode switch turns on the front headlights and back lights. See **Figure 5.39**.

5.5.14.3. The dash backlighting will operate normally under headlamp lights mode conditions.

5.5.14.4. The compartment lights will also operate normally.

5.5.15. Dashboard dimmer control. See **Figure 5.40.**

5.5.15.1. Click UP for BRIGHTER dash lighting.

5.5.15.2. Click DOWN for DIMMER dash lighting.

Figure 5.40. Dashboard Dimmer Control.

5.5.16. Engine shutdown.

5.5.16.1. Pull parking bake knot to set parking brakes.

5.5.16.2. Shift transmission to Neutral N.

5.5.16.3. Idle for 3 to 5 minutes.

5.5.16.4. Turn the ignition switch from RUN to OFF.

5.5.16.5. Flip battery disconnect and toggle switches to the UP position.

5.5.17. Secure from operations.

5.5.17.1. Chock at least two wheels, on opposite sides of the vehicle.

5.5.17.2. Secure vehicle:

5.5.17.2.1. Close all doors, stowage bins, hatches, and turn off master battery switch.

5.5.18. Winch operations.

5.5.18.1. Follow the steps below to ensure safety and recovery of the winch during operation:

5.5.18.1.1. Check the capacity of the winch. The capacity shown on the manufacturers' plate is the maximum with one layer of cable on the drum. Each additional layer increases the diameter of the drum and decreases the capacity to as little as 50 percent.

5.5.18.1.2. Check the cable for rust, kinks, or frays.

5.5.18.1.3. Estimate the total resistance. Consider all factors that would affect the winch and the item it will be pulling.

5.5.18.1.4. Check the equipment. Be sure to rig safely to overcome the resistance with the equipment available.

5.5.18.1.5. Select or provide a suitable anchor.

5.5.18.1.6. Rig and check rigging. Do not put power on the winch until after checking every element in the rigging and are satisfied that there are no mistakes.

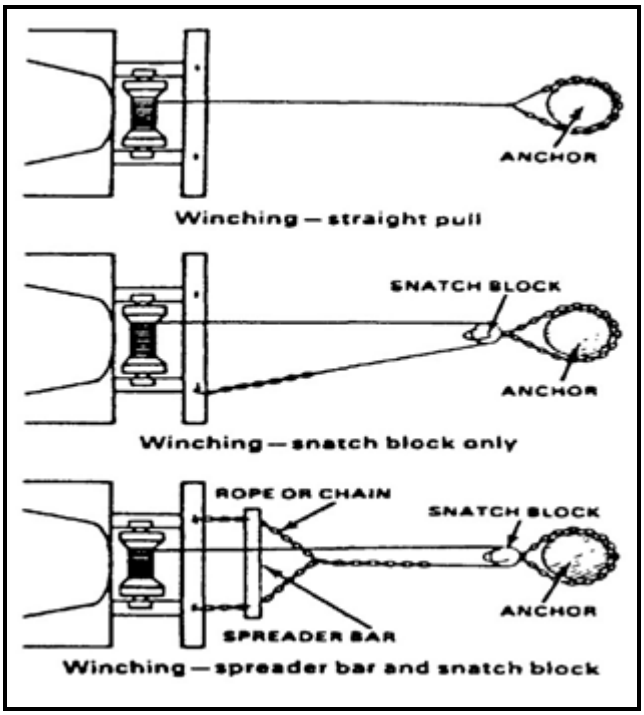
5.5.18.1.7. Clear personnel from the danger area. All personnel standing observing the operation should stand outside the angle formed by the cable under stress at a distance. Clear all personnel away before tightening the cable.

5.5.18.2. Single-vehicle winch operations.

5.5.18.2.1. If the vehicle been dispatched alone and gets into a spot where its traction is not enough to get through, the operator will need to use the winch and a suitable right to pull the vehicle through.

5.5.18.2.2. Vehicle with winch: Select or construct a strong anchor. Attach a snatch block to the anchor with the tow chain, run the winch cable through the block and back to the truck. (See **Figure 5.41.**) Take up the slack gradually and pull the truck forward with its winch. Power may be applied to the wheels at the same time. Refer to the vehicle manufacturer's operator's manual for additional details on the operating the vehicle and winch.

Figure 5.41. Vehicle Winching.



5.5.18.3. Two-vehicle winch operation.

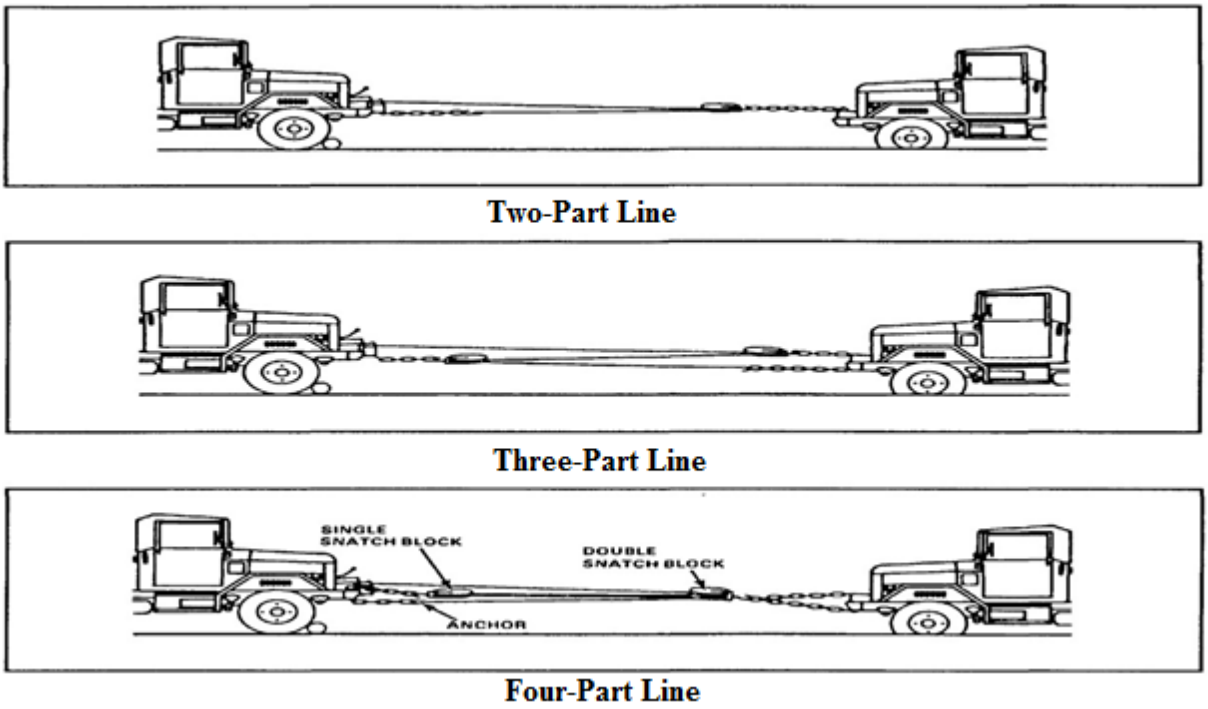
5.5.18.3.1. Mechanical advantage is gained by using a mechanism to transmit force. Small force, when moves through a long distance by one or more mechanisms (pulleys), will move a large weight (vehicle) for a short distance. Use one of the following procedures when rigging for greater mechanical advantage.

5.5.18.3.1.1. Two-part line: This hookup gives a 2:1 advantage (see **Figure 5.42.**). Attach a snatch block to the load. Next, run the winch cable through the block and secure the cable to the winch vehicle. Place a log in front of the towing vehicle to help hold its ground.

5.5.18.3.1.2. Three-part line: To get a mechanical advantage of 3:1, use two snatch blocks- one at the load and one on the winch vehicle (see **Figure 5.42.**). Thread the winch cable first through the block on the load, back through the block on the winch and then again to the load where it is secured.

5.5.18.3.1.3. Four-part line: This gives the Operator a 4:1 advantage. Use two snatch blocks- a double-sheave block for the load and s single-sheave block for the winch vehicle (see **Figure 5.42.**). Thread the winch cable through one sheave of the double block attached to the load, back through the single- sheave on the winch vehicle and again to the load through the second sheave of the double block. Finally secure it to the winch vehicle.

Figure 5.42. Two Vehicle Winch Operations.



5.5.19. Jump/slave starting operations.

5.5.19.1. A slave cable is one large cable that is connected from one running NATO vehicle (i.e. "Deuce" etc.) to the dead vehicle. There is no positive and negative post like commercial vehicle class type. Just hook up one end of the slave cable to the running vehicle and the other end to the dead vehicle and jump similar to normal vehicles. The slave cables should have 24 prongs attached under the plug. It plugs into the back end of any M series vehicle and is a 24 volt connection.

Note: The slave cables are used for NATO vehicles only.

5.5.19.2. Position slaving vehicle and disabled vehicle close enough for cable hookup.

5.5.19.3. Stop slaving vehicle engine.

5.5.19.4. Remove cover from slave receptacle of disabled vehicle and slaving vehicle.

5.5.19.5. Warning - Ensure all battery cables in disabled vehicle are properly connected before connecting slave cable. Damage to batteries, cables or serious injury to personnel may result from improperly connected batteries

5.5.19.6. Caution - Use a twisting motion when installing slave cable to the receptacle. Forcefully pushing the cable onto the receptacle may cause damage to the receptacle mount.

Note: Ensure all electrical switches in both vehicles are turned-off.

5.5.19.7. Connect slave cable to the slave receptacle of both vehicles.

5.5.19.8. Start slaving the vehicle engine.

5.5.19.9. Start the disabled vehicle engine.

5.5.19.10. After engine starts, disconnect slave cable from both vehicles.

5.5.19.11. Install receptacle covers on both vehicles.

Note: For easy removal, apply hand cleaner on the inside of the cover before installing the receptacle covers.

5.5.20. Gunner's platform operation.

5.5.20.1. Before-operation:

5.5.20.1.1. Depress two lock buttons on locking pins and remove locking pins from locking lugs and holes securing platform in stowed position. Grasp hand hold on platform to lift platform to either half-height position or full- height position. If half-height position is required, lift platform all the way up, and turn two latches so that ledges of latches are facing up and parallel to bottom edge of platform.

5.5.20.1.2. Lower the platform and allow it to rest on the ledges of latch at half- height position. Insert locking pins through forward locking holes in platform and holes in platform risers. If full-height position is required, lift platform to the full-height position, and ensure that rear locking holes in left and right sides of platform are aligned with locking holes in platform risers. Insert locking pins through rear locking holes in platform and holes in platform risers.

5.5.20.2. After-operation:

5.5.20.2.1. Remove locking pins securing platform in either half-height position or full-height position by pressing lock buttons and removing locking pins. Lift up on platform and turn two latches so that ledges of latch are facing downward, parallel to floor.

5.5.20.2.2. Lower platform to stowed position, and align locking holes with locking lugs. Insert locking pins through locking holes and lugs.

5.5.21. Runflat operations. The vehicles are equipped with runflat tires, allowing the vehicle to be driven with one or two tires flat. For runflat operations, refer to **Table 5.4.**

Table 5.4. Runflat Operations.

Combination of Flat Tires	Recommended Vehicle Speed	Distance
Two tires flat- rear	35 mph max.	30 mi (48 km)
One tire flat- any location	35 mph	30 mi (48 km)
Two tires flat- same side	35 mph	30 mi (48 km)
Two tires flat-front only	35 mph	30 i (48 km)

Note: WARNING - Do not exceed 35 mph during any runflat operations. Do not exceed 20 mph (32 kph) with both rear tires flat. Do not operate the vehicle for more than 30 miles.

5.5.21.1. Speeds indicated in **Table 5.4.** are the maximum speeds and must be reduced when traveling on secondary roads, cross- country, or in traffic. Failure to reduce speeds could cause loss of control of vehicle causing damage to equipment and injury or death to personnel.

5.5.21.2. When driving a vehicle existing conditions are constantly changing. Never drive at a speed greater than is reasonable and prudent for these conditions. Loss of vehicle control may occur, causing damage to equipment and injury or death to personnel.

Note: WARNING - A wheel that has been ran flat must be replaced and inspected by unit maintenance as soon as possible before reuse, or damage to equipment may result.

5.5.21.3. Run flat operation may cause the tread to separate from the tire and/or wheel. If abnormal handling is experienced or noise such as flapping or pounding around the wheel well occurs, the tread needs to be cut away from the wheel before continuing operation. Failure to do so could result in damage to the vehicle.

Section 6—EXPLANATION AND DEMONSTRATION

6.1. Instructor's Preparation.

6.1.1. Establish a training location.

6.1.2. Obtain appropriate vehicle operator's manual.

6.1.3. Schedule/reserve a vehicle.

6.1.4. Ensure trainee completes AF Form 171.

6.2. Safety Procedures and Equipment.

6.2.1. The following safety items should be followed by both the instructor and trainee.

6.2.1.1. Chock wheel (if required) when MRAP is parked.

6.2.1.2. Remove all jewelry and identification tags.

6.2.1.3. Personal protective equipment and equipment items.

6.2.1.3.1. Safety steel-toed boots must be worn.

6.2.1.3.2. First aid kit.

6.2.1.3.3. Raingear, cold weather gear, etc.

6.2.1.3.4. Reflective belt during hours of reduced visibility or on the flightline.

6.2.1.3.5. Hearing/eye protection.

6.2.1.3.6. Hand protection.

6.2.1.3.7. Head protection.

6.2.1.4. Walk around vehicle to become familiar with and to familiarize and the trainee with all warning labels and signs.

6.2.1.5. Ensure trainee wears seat belts.

6.2.1.6. Properly adjust driver's seat and all mirrors, if available.

6.2.1.7. Throughout demonstration, practice MRAP safety.

6.2.2. Practice basic RM process during demonstration:

6.2.2.1. Identify hazards.

6.2.2.2. Assess hazards.

6.2.2.3. Develop controls and make decisions.

6.2.2.4. Implement controls.

6.2.2.5. Supervise and evaluate.

6.3. Operator Maintenance Demonstration.

6.3.1. With trainee, accomplish vehicle inspection using AF Form 1800, *Operator's Inspection Guide and Trouble Report.* The vehicle inspection will follow the seven-step method as described in **Attachment 4**. An inspection guide (**Attachment 2**) can be used to ensure all areas of the MRAP are covered in addition to the "Operation Demonstration" guidelines provided below.

6.4. Operation Demonstration.

6.4.1. Throughout demonstration:

6.4.1.1. Allow for questions.

6.4.1.2. Repeat demonstrations as needed.

6.4.2. For all MRAPs, within the training area, demonstrate and explain the following. **Note:** Use information contained on the data plate and/or the operator's manual:

6.4.2.1. Specific MRAP capacities: Explain parking brake as they apply to MRAP being used.

6.4.2.2. MRAP controls.

6.4.2.2.1. Shifting pattern.

6.4.2.2.2. Overdrive.

6.4.2.3. Point out the items to be inspected during operations.

6.4.2.3.1. Instruments.

6.4.2.3.2. Air pressure gauge (if the vehicle has air brakes).

6.4.2.3.3. Temperature gauges.

6.4.2.3.4. Pressure gauges.

6.4.2.3.5. Ammeter/voltmeter.

6.4.2.3.6. Mirrors.

6.4.2.3.7. Tires.

6.4.2.3.8. Cargo, cargo covers.

6.4.3. Demonstrate the following MRAP operations and procedures (use spotter when backing).

6.4.3.1. General driving procedures.

6.4.3.2. Right/left turns.

6.4.3.3. Intersection.

6.4.3.4. Urban/rural straight.

6.4.3.5. Stopping/starting.

6.4.3.6. Curves.

6.4.3.7. Railroad crossing.

6.4.3.8. Bridge/overpass/sign.

6.4.4. With the MRAP, demonstrate driving on an off-road course approved by Security Forces.

6.4.4.1. All-terrain operation:

6.4.4.1.1. Sandy area.

6.4.4.1.2. Swampy and sandy area.

6.4.4.1.3. Ditches.

6.4.4.1.4. Rocky terrain.

6.4.4.2. Proper use of BO markers/turret.

6.4.4.3. Backing.

6.4.4.4. Parking.

6.4.4.5. Nighttime operations.

6.4.5. Show trainee the after operation inspection and report.

6.4.5.1. Ensure vehicle is cleaned.

6.4.5.2. Cargo straps and chains are properly stowed.

6.4.5.3. Refuel vehicle.

6.4.5.4. Following manufacturer's shut-down procedures.

6.4.5.5. Park.

6.4.5.5.1. Apply brakes.

6.4.5.5.2. Place transmission in neutral (park or an automatic).

6.4.5.6. Perform a walk-around inspection.

6.4.5.7. Annotate any discrepancies found on AF Form 1800.

6.4.6. Conclude by allowing time for questions and any requested re-demonstrations.

Section 7—TRAINEE PERFORMANCE AND EVALUATION

7.1. Trainee Performance.

7.1.1. Instructor will:

7.1.1.1. Ensure safety at all times. **Note:** Stop training when safety items are violated. Proceed only when the trainee fully understands how to avoid repeating the safety infraction(s).

7.1.1.1.1. Chock wheel (if required) when MRAP is parked.

7.1.1.1.2. Remove all jewelry and identification tags.

Note: If available, mark vehicle with magnetic sign indicating "Driver-in-Training" or "Trainee Operator."

7.1.1.2. Personal protective equipment and other items:

7.1.1.2.1. Safety steel-toed boots must be worn.

7.1.1.2.2. Hand protection.

7.1.1.2.3. Head protection.

7.1.1.2.4. First aid kit.

7.1.1.2.5. Reflective belt during hours of reduced visibility or on the flightline.

7.1.1.2.6. Raingear, cold weather gear, etc.

7.1.1.2.7. Hearing/eye protection.

7.1.1.3. Pay particular attention to the cautions and warnings listed in the operator's manual.

7.1.1.4. Ensure trainee wears seat belts.

7.1.1.5. Properly adjust driver's seat and all mirrors.

7.1.1.6. MRAP safety items/procedures.

7.1.1.7. Ensure the driver is aware of driving situations he/she is to perform.

7.1.1.8. Conduct during/after-action reviews with the trainee (demonstration may need to be re-accomplished).

7.1.2. Trainee will:

7.1.2.1. Ensure AF From 1800 is properly documented.

7.1.2.2. Demonstrate required operations and procedures:

7.1.3. Trainee Performance.

7.1.3.1. Conduct operator maintenance (have trainee explain items being inspected). **Note:** Allow trainee to use **Attachment 2** as a guide while performing inspection.

7.1.3.1.1. Backing. Serve as the trainee's spotter, or if available, have another trainee be the spotter.

7.1.3.1.2. Continue until trainee can show proficiency in operating.

7.1.3.2. Have trainee practice the MRAP operations listed below (use spotter when backing) until they can safely and efficiently perform.

7.1.3.3. Establish an off-road course and operate the MRAP until trainee performs maneuvers safely and efficiently.

7.1.3.4. Establish a road course and operate the MRAP until trainee performs safely and efficiently, the course should include the following:

7.1.3.4.1. General driving procedures.

7.1.3.4.2. Right/left turns.

7.1.3.4.3. Intersection.

7.1.3.4.4. Urban/rural straight.

7.1.3.4.5. Stopping/starting.

7.1.3.4.6. Curves.

7.1.3.4.7. Railroad crossing.

7.1.3.4.8. Bridge/overpass/sign.

7.1.3.4.9. All-terrain operation:

7.1.3.4.9.1. Sandy area.

7.1.3.4.9.2. Swampy and sandy area.

7.1.3.4.9.3. Ditches.

7.1.3.4.9.4. Rocky terrain.

7.1.3.4.10. Proper use of BO markers/turret.

7.1.3.4.11. Backing.

7.1.3.4.12. Parking.

7.1.3.4.13. Nighttime operations.

7.1.3.5. Perform after-operation inspection.

7.1.3.5.1. Ensure vehicle cleaned.

7.1.3.5.2. Cargo straps and chains are properly stowed.

7.1.3.5.3. Refueled.

7.1.3.5.4. Following manufacturer’s shut-down procedures.

7.1.3.5.5. Park.

7.1.3.5.6. Apply brakes.

7.1.3.5.7. Place transmission in neutral (park or an automatic).

7.1.3.6. Perform a walk-around inspection.

7.1.3.7. Report any discrepancies found on AF Form 1800.

7.2. Performance Evaluation.

7.2.1. Trainee will perform performance evaluation found in **Attachment 3**.

7.2.1.1. Instructor and trainee will review **Attachment 3**.

7.2.1.2. Instructor will answer trainee's questions.

Note: If available, mark vehicle with magnetic sign indicating "Driver-in-Training" or "Trainee Operator."

7.2.2. Instructor will:

7.2.2.1. Ensure safety at all times.

7.2.2.1.1. Place wheel chocks (if required) when MRAP is parked.

7.2.2.1.2. Remove all jewelry and identification tags.

7.2.2.2. Personal protective equipment and other items.

7.2.2.2.1. Safety steel-toed boots must be worn.

7.2.2.2.2. Hand protection.

7.2.2.2.3. First aid kit.

7.2.2.2.4. Reflective belt during hours of reduced visibility or on the flightline.

7.2.2.2.5. Hearing/eye protection.

7.2.2.2.6. Head protection.

7.2.2.3. Pay particular attention to the cautions and warnings listed in the operator's manual.

7.2.2.4. Ensure trainee wears seat belts.

7.2.2.5. Properly adjust driver's seat and all mirrors (if available).

7.2.2.6. MRAP safety items/procedures.

7.2.3. Explain driving techniques.

7.2.4. Establish a road course that will have the following: (if the course does not have one of the following, then the trainee should be able to explain the correct driving techniques).

7.2.4.1. General driving procedures.

7.2.4.2. Right/left turns.

7.2.4.3. Intersection.

7.2.4.4. Urban/rural straight.

7.2.4.5. Stopping/starting.

7.2.4.6. Curves.

7.2.4.7. Railroad crossing.

7.2.4.8. Bridge/overpass/sign.

7.2.4.9. All-terrain operation:

7.2.4.9.1. Sandy area.

7.2.4.9.2. Swampy and sandy area.

7.2.4.9.3. Ditches.

7.2.4.9.4. Rocky terrain.

7.2.4.10. Proper use of BO markers/turret.

7.2.4.11. Backing.

7.2.4.12. Parking.

7.2.4.13. Nighttime operations.

7.2.5. Ensure the driver is aware of driving situations.

7.2.6. Conduct after-action reviews with the trainee.

7.2.7. Trainee is not allowed any instructor assists to pass performance evaluation.

7.2.8. Evaluation checklist provided in **Attachment 3**.

7.2.9. Retraining; retrain No-Go’s.

7.2.9.1. Re-demonstrate No-Go items.

7.2.9.2. Have trainee re-perform until they show proficiency in operating, critique weaknesses as observed.

7.2.9.3. Re-evaluate.

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References
AFI 24-301, *Ground Transportation*, 1 November 2018
AFMAN 24-306, *Operation of Air Force Government Motor Vehicles*, 9 December 2016
AFPAM 90-803, *Risk Management (RM) Guidelines and Tools*, 11 February 2013

Adopted Forms
AF Form 171, *Request for Driver's Training and Addition to U.S. Government Driver's License*, 1 November 2018
AF Form 847, *Recommendation for Change of Publication*
AF Form 1800, *Operator's Inspection Guide and Trouble Report*

Abbreviations and Acronyms
ABS—Antilock Brake System
AF—Air Force
AFI—Air Force Instruction
AFIMSC—Air Force Installation Mission Support Center
AFMAN—Air Force Manual
AFQTP—Air Force Qualification Training Plan
AWD—All-Wheel Drive
BO—Blackout
COTS—Commercial Off the Shelf
ECU—Electronic Control Unit
FSS—Fire Suppression System
GVWR—Gross Vehicle Weight Rating
HVAC—Heating, Ventilation, and Air Conditioning
IAW—In Accordance With
IED—Improvised Explosive Device
IR—Infrared
LSS—Life Support System
MRAP—Mine Resistance Ambush Protected
MSD—Maximum Stopping Distance
NMC—Not Mission Capable
ONET—Operator New Equipment Training
RM—Risk Management
TO—Technical Order
VCO—Vehicle Control Official
6WD—Six Wheel Drive

Attachment 2

MRAP INSPECTION GUIDE

GENERAL

STEP 1. VEHICLE OVERVIEW

☐ Paperwork
- AF Form 1800
- Discrepancy Correction Complete (VM Annotation)

☐ Vehicle Approach
- Damage
- Vehicle Leaning
- Fresh Leakage of Fluids
- Hazards Surrounding Vehicle

INTERNAL

STEP 2. ENGINE COMPARTMENT

☐ Leaks/hoses/Electrical Wiring Insulation
☐ Oil Level
☐ Coolant Level
☐ Power Steering Fluid
☐ Hydraulic Fluid
☐ Windshield Washer Fluid
☐ Battery Fluid Level, Connections & Tie-downs
☐ Automatic Transmission Fluid Level
☐ Fluid Water Separator
☐ Engine Compartment Belts

STEP 3. ENGINE START/CAB CHECK (LEFT/FRONT/RIGHT)

☐ Safe Start
☐ Gauges
- Oil Pressure Gauge
- Air Pressure Gauge
- Temperature Gauge (Coolant/Engine Oil)
- Ammeter/Voltmeter

☐ Fire Suppression System
☐ Warning Lights & Buzzers
☐ Mirrors & Windshield & Ballistic Glass
☐ Wipers/Washers

☐ Emergency & Safety Equipment
- Red Reflective Triangles
- Properly Charged & Rated Fire Extinguisher
- Optional (Chains/Tire Changing Equip, Emergency Phone List)

☐ **3B** – Lights/Reflectors/Reflector Tape Condition (Front/Sides/Rear)
(Dash Indicators for:)
- Left Turn Signal
- Right Turn Signal
- Four-Way Emergency Flashers
- High Beam Headlight
- ABS Indicator (If equipped)
- Clearance Lights

(Reflective Clean & Functional Light & Reflector Checks Include:)
- Headlights
- Taillights
- Backing Lights
- Turn Signals
- Four-Way Flashers
- Brake Lights
- Red Reflectors & Amber Reflectors
- Reflective Tape Condition
- Blackout Lights/Markers

☐ Horn
☐ Heater/Defroster
☐ Brakes
- Parking Brake Check
- Air Brake Check (if equipped)
- Service Brake Check
- Safety Belt

(TURN-OFF ENGINE/TURN-ON HEADLIGHTS *LOW BEAM* AND FOUR-WAY FLASHERS)

STEP 4. WALK-AROUND INSPECTION

☐ **4A** – Steering
- Steering Box/Hoses
- Steering Linkages

☐ **4B** – Suspension
- Springs/Air/Torque
- Mounts
- Shock Absorbers

☐ **4C** – Brakes
- Brake Chambers
- Brake Hoses/Lines
- Drum Brake
- Brake Linings

☐ **4D** – Wheels
- Rims
- Tires
- Hub Oil Seals/Axle Seals
- Lug Nuts
- Spacers & Budd Spacing

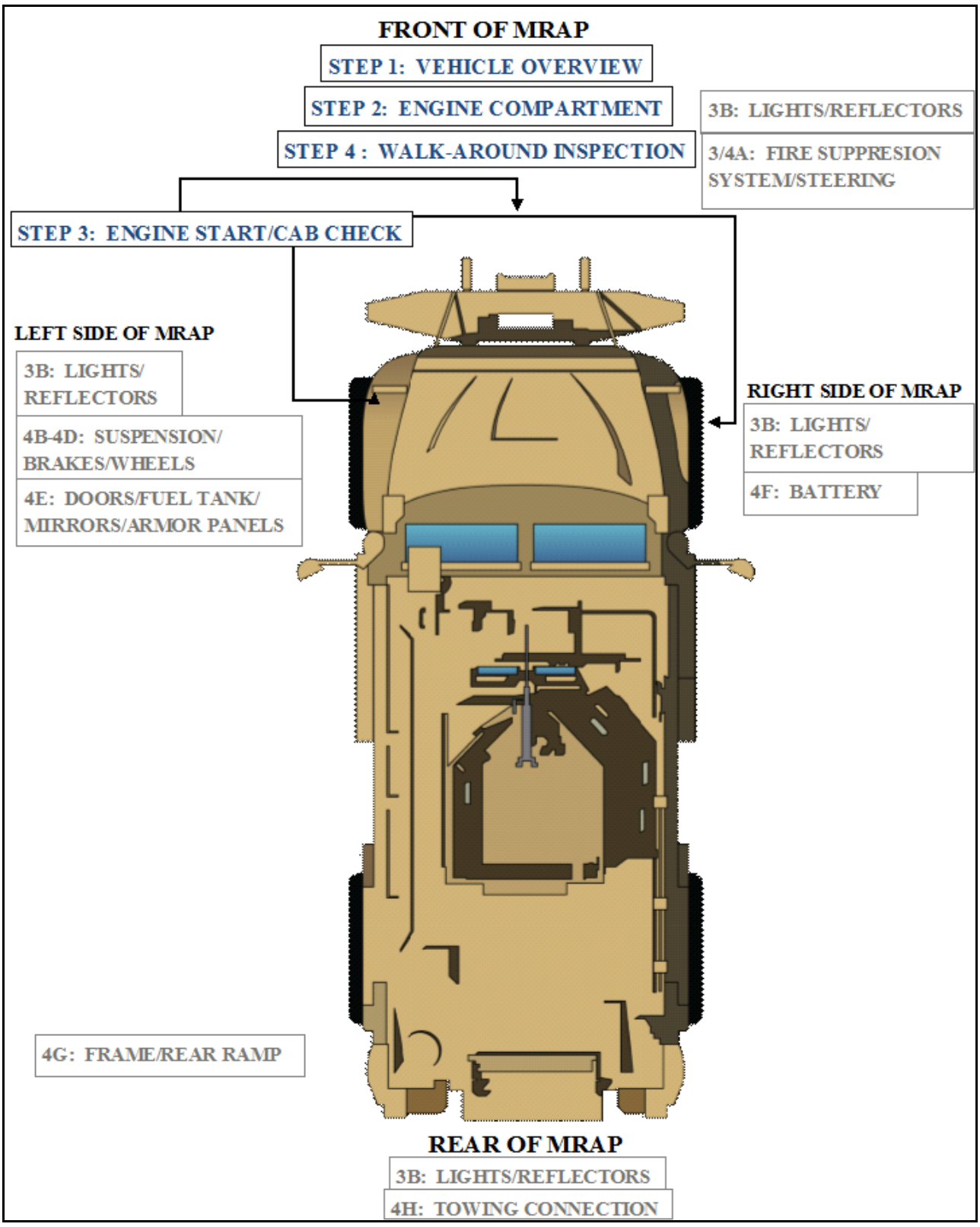
SIDE OF VEHICLE

☐ **4E** – Doors
☐ **4E** – Mirrors
☐ **4E** – Fuel Tank
☐ **4E** – Armor Panels
☐ **4F** – Battery

REAR OF VEHICLE

☐ **4G** – Frame
☐ **4G** – Rear Ramp
☐ **4H** – Towing Connection

Figure A2.1. MRAP Vehicle Inspection Guide.



Attachment 3

PERFORMANCE TEST

A3.1. Desired Learning Outcome.

A3.1.1. Understand the safety precautions to be followed before-, during-, and after-operation of the MRAP.

A3.1.2. Understand the purpose of the MRAP and their role in the mission.

A3.1.3. Know the proper operator maintenance procedures of the MRAP, IAW applicable TOs and use of AF Form 1800.

A3.1.4. Safely and proficiently operate the MRAP.

A3.2. Instructions. Before beginning the performance test, the trainer will brief the trainee on the scenario the trainee will need to accomplish. He/she will be given additional directions and instructions as needed to proceed through the scenario.

A3.3. Scoring.

A3.3.1. The trainer examiner will be scoring on MRAP operations and also the general safe driving practices. The examiner will give directions and instructions to the trainee in sufficient time for to execute a driving maneuver. He/she will not be asked to drive in an unsafe manner.

A3.3.2. The examiner will be making various marks on the performance test checklist. This does not necessarily mean the trainee have done anything wrong. It is in the best interest to concentrate on the operation of the MRAP. The trainer will explain the test results to the trainee at the conclusion of the performance test.

A3.3.3. Tasks being graded are listed on the following page; the trainee will be required to successfully pass all items.

A3.3.4. The instructor will stop the test at any time safe MRAP operations are not being followed or as deemed necessary for safety concerns.

Figure A3.1. Performance Test Checklist:

PERFORMANCE TEST			
Trainees Name:		**Date:**	
Event	**Go**	**No Go**	**Notes**
1. PRE, DURING, AND POST- OPERATION INSPECTION			
1.1. Operator has required Personal Protective Equipment.			
1.2. Follows general pattern of pre-trip checklist.			
1.3. Performs brake component check			
1.4. Signs AF Form 1800 to signify accomplishment of complete inspection.			
1.5. Cleans windshield, windows, mirrors, lights and reflectors			
1.6. Continues during operations inspection checks.			
1.7. Knows use of jacks, tools, emergency devices, tire chains, fire extinguishers, etc.			
1.8. Performs post trip inspection and reports malfunctions to Vehicle Management.			
1.9. Inspects tires for FOD and tire pressure.			
Event	**Go**	**No Go**	**Notes**
2. ON-ROAD DRIVING TEST			
2.1. General - safety belt is used; obeys all traffic signs, signals, and laws; completes test without an accident or moving violation.			
2.2. Stopping - decelerates smoothly, brakes evenly, changes gears as necessary; brings vehicle to a full stop without coasting.			
2.3. Starting - checks traffic, avoids jerky starts.			
2.4. Curves - before entering the curve, reduces speed and is in proper gear; keeps vehicle in the lane; continues checking traffic in all directions.			

2.5. Bridge/Overpass/Sign -can identify the posted clearance or height, the posted weight limit when going over bridge and explains any traffic sign which may appear on the route.			
Event	**Go**	**No Go**	**Notes**
3. OFF-ROAD DRIVING TEST			
3.1. General – safety belt is used; obeys all traffic signs, signals, and laws; completes test without an accident or moving violation.			
3.2. Turns – slows down smoothly, changes gears as needed to keep power, and checks mirrors to ensure proper clearance.			
3.3. Sandy Area – Maintains a speed that does not strain the vehicle or the engine. Reduces tire pressure. Comes to a halt instead of a stop/brake gradually when stopping.			
3.4. Swampy Area – Maintains a steady and even rate of movement.			
3.5. Winter Driving – Starts driving in second or third gear rather than first or low. Avoids quick acceleration. Aware of shaded areas due to slick ice. Drives at reduced speeds.			
Event	**Go**	**No Go**	**Notes**
4. KNOWLEDGE OF VEHICLE AND USE OF CONTROLS			
4.1. Engine:			
Uses proper starting procedures			
Allows proper warm-up.			
Understands all gauges.			
Uses proper shutdown procedures.			
Basic knowledge of engines.			
4.2. Brakes and Braking Techniques.			
Proper use of parking brake.			
Proper use of BO markers/turret.			

Event:	Go	No Go	Notes
5. BACKING/PARKING:			
5.1. Backing			
Positions MRAP properly.			
Inspects MRAP before backing.			
Post guide before backing and uses spotters properly.			
Uses mirrors properly.			
Avoids blind side backing.			
Controls speed.			
5.2. Parking.			
Checks traffic position before parking.			
Secures MRAP properly.			
Parks legally and safely.			
Pulls completely off pavement when possible.			
Knows proper use of emergency warning devices.			
Uses emergency warning devices.			
CERTIFIER COMMENTS:			

Attachment 4

SEVEN-STEP INSPECTION PROCESS

Figure A4.1. Seven-Step Inspection Process.

Seven-Step Inspection Process	
Step	**Procedure**
1. Vehicle Overview	• Review the AF Form 1800. o Ensure any discrepancy has been corrected. o Vehicle Management annotated the discrepancy was completed. o Approaching the vehicle. ▪ Damage or vehicle leaning to one side. ▪ Fresh leakage of fluids. ▪ Hazards around vehicle.
2. Check Engine Compartment	• **Note:** Check that the parking brakes are on and/or wheels chocked. The operator may have to raise the hood, tilt the cab (secure loose things so they don't fall and break something), or open the engine compartment door. • Check the following: o Engine oil level. o Coolant level in radiator; condition of hoses. o Power steering fluid level; hose condition (if so equipped). o Windshield washer fluid level. o Battery fluid level, connections and tie-downs (battery may be located elsewhere). o Automatic transmission fluid level (may require engine to be running). o Check belts for tightness and excessive wear (alternator, water pump, air compressor)--learn how much "give" the belts should have when adjusted right.

	o Leaks in the engine compartment (fuel, coolant, oil, power steering fluid, hydraulic fluid, battery fluid). Cracked, worn electrical wiring insulation.
3. Start Engine and Inspect Inside the Cab (Get in and Start Engine)	• Make sure parking brake is on. • Put gearshift in neutral (or park if automatic). Start engine; listen for unusual noises. • If equipped, check the Anti-lock Braking System (ABS) indicator lights. Light on dash should come on and then turn-off. If it stays on the ABS is not working properly. • Look at the gauges. o Oil pressure. Should come up to normal within seconds after engine is started. o Air pressure. Pressure should build from 50 to 90 psi within 3 minutes. Build air pressure to governor cut-out (usually around 120 – 140 psi. Know the vehicle's requirements. o Ammeter and/or voltmeter. Should be in normal range(s). o Coolant temperature. Should begin gradual rise to normal operating range. o Engine oil temperature. Should begin gradual rise to normal operating range. o Warning lights and buzzers. Oil, coolant, charging circuit warning, and antilock brake system lights should go out right away. o Check Condition of Controls. Check all of the following for looseness, sticking, damage, or improper setting: ▪ Steering wheel. ▪ Clutch. ▪ Accelerator (gas pedal). ▪ Brake controls. ▪ Foot brake. ▪ Parking brake. ▪ Transmission controls.

	▪ Interaxle differential lock (if vehicle has one). ▪ Horn(s). ▪ Windshield wiper/washer. ▪ Lights. ▪ Headlights. ▪ Dimmer switch. ▪ Turn signal. ▪ Four-way flashers. ▪ Parking – clearance – identification – marker switch (switches). • Check mirrors and windshield. o Inspect mirrors and windshield for cracks, dirt, illegal stickers, or other obstructions to seeing clearly. Clean and adjust as necessary. • Check emergency equipment. o Check for safety equipment: ▪ Spare electrical fuses (unless vehicle has circuit breakers). ▪ Three red reflective triangles, 6 fuses or 3 liquid burning flares. ▪ Properly charged and rated fire extinguisher. Check for optional items such as: ▪ Tire changing equipment. ▪ List of emergency phone numbers Accident reporting kit (packet). o Check safety belt. Check that the safety belt is securely mounted, adjusts; latches properly and is not ripped or frayed.
4. Turn-off Engine	• Make sure the parking brake is set, turn-off the engine, and take the key with. • Turn-on headlights (low beams) and four-way emergency flashers, and get out of the vehicle.
5. Do Walk-Around Inspection	• General. o Go to front of vehicle and check that low beams are on and both of the four-way flashers are working. o Push dimmer switch and check that high beams work. o Turn-off headlights and four-way emergency flashers.

	o Turn-on parking, clearance, side-marker, and identification lights. o Turn-on right turn signal, and start walk-around inspection. o Walk around and inspect. ▪ Clean all lights, reflectors, and glass as while doing the walk-around inspection. • Left front side. o Driver's door glass should be clean. o Door latches or locks should work properly. • Left front wheel. o Condition of wheel and rim--missing, bent, broken studs, clamps, lugs, or any signs of misalignment. o Condition of tires--properly inflated, valve stem and cap OK, no serious cuts, bulges, or tread wear. o Use wrench to test rust-streaked lug nuts, indicating looseness. o Hub oil level OK, no leaks. Left front suspension. o Condition of spring, spring hangers, shackles, o U-bolts. o Shock absorber condition. • Left front brake. o Condition of brake drum or disc. o Condition of hoses. • Front. o Condition of front axle. Condition of steering system. o No loose, worn, bent, damaged or missing parts. o Must grab steering mechanism to test for looseness. o Condition of windshield. o Check for damage and clean if dirty. o Check windshield wiper arms for proper spring tension. o Check wiper blades for damage, "stiff" rubber, and securement. o Lights and reflectors.

	o Parking, clearance, and identification lights clean, operating, and proper color (amber at front). o Reflectors clean and proper color (amber at front). o Right front turn signal light clean, operating, and proper color (amber or white on signals facing forward). • Right side. o Right front: check all items as done on left front. o Primary and secondary safety cab locks engaged (if cab-over-engine design). o Right fuel tank(s). o Securely mounted, not damaged, or leaking. Fuel crossover line secure. o Tank(s) contain enough fuel. Cap(s) on and secure. o Condition of visible parts. Rear of engine--not leaking. Transmission--not leaking. o Exhaust system--secure, not leaking, not touching wires, fuel, or air-lines. o Frame and cross members--no bends or cracks. o Spare tire carrier or rack not damaged (if so equipped). o Spare tire and/or wheel securely mounted in rack. o Spare tire and wheel adequate (proper size, properly inflated). o Cargo securement). o Curbside cargo compartment doors in good condition, securely closed, latched/locked and required security seals in place. • Right rear. o Condition of wheels and rims--no missing, bent, or broken spacers, studs, clamps, or lugs. o Condition of tires--properly inflated, valve stems and caps OK, no serious cuts, bulges, tread wear, tires not rubbing each other, and nothing stuck between them.

	o Tires same type, e.g., not mixed radial and bias types. o Tires evenly matched (same sizes). Wheel bearing/seals not leaking. o Suspension. o Condition of spring(s), spring hangers, shackles, and U-bolts. o Axle secure. o Powered axle(s) not leaking lube (gear oil). Condition of torque rod arms, bushings. o Condition of shock absorber(s). o If retractable axle equipped, check condition of lift mechanism. If air powered, check for leaks. o Condition of air ride components. o Brakes. o Brake adjustment. o Condition of brake drum(s) or discs. o Condition of hoses--look for any wear due to rubbing. o Lights and reflectors. o Side-marker lights clean, operating, and proper color (red at rear, others amber). o Side-marker reflectors clean and proper color (red at rear, others amber). • Rear. o Lights and reflectors. o Rear clearance and identification lights clean, operating, and proper color (red at rear). o Reflectors clean and proper color (red at rear). o Taillights clean, operating, and proper color (red at rear). o Right rear turn signal operating, and proper color (red, yellow, or amber at rear). o License plate(s) present, clean, and secured. o Splash guards present, not damaged, properly fastened, not dragging on ground, or rubbing tires. o Cargo secure

	o End gates free of damage, properly secured in stake sockets. o Rear doors securely closed, latched/locked. • Left side. o Check all items as done on right side, plus: o Battery (batteries) (if not mounted in engine compartment). o Battery box (boxes) securely mounted to vehicle. Box has secure cover. o Battery (batteries) secured against movement. Battery (batteries) not broken or leaking. o Fluid in battery (batteries) at proper level (except maintenance-free type). o Cell caps present and securely tightened (except maintenance-free type). o Vents in cell caps free of foreign material (except maintenance-free type).
6. Check Signal Lights	• Get in and turn-off all lights. • Turn-on stop lights (apply trailer hand brake or have a helper put on the brake pedal). • Turn-on left turn signal lights. • Get out and check lights. • Left front turn signal light clean, operating and proper color (amber or white on signals facing the front). • Left rear turn signal light and both stop lights clean operating, and proper color (red, yellow, or amber). • Get in vehicle. o Check BO lights. o Turn-off lights not needed for driving. o Check for all required papers, trip manifests, permits, etc. o Secure all loose articles in cab (they might interfere with operation of the controls or hit the operator in a crash). o Start the engine.

7. Start the Engine and Check Test for Hydraulic Leaks	• Test for hydraulic leaks. o If the vehicle has hydraulic brakes, pump the brake pedal three times. o Then apply firm pressure to the pedal and hold for five seconds. o The pedal should not move. If it does, there may be a leak or other problem. • Brake system. • Test parking brake. o Fasten safety belt. o Set parking brake (power unit only). Release trailer parking brake (if applicable). Place vehicle into a low gear. o Gently pull forward against parking brake to make sure the parking brake holds. o Repeat the same steps for the trailer with trailer parking brake set and power unit parking brakes released (if applicable). o If it doesn't hold vehicle, it is faulty; get it fixed. • Test service brake stopping action. o Go about 5 miles per hour. o Push brake pedal firmly. o "Pulling" to one side or the other can mean brake trouble. o Any unusual brake pedal "feel" or delayed stopping action can mean trouble. o If the trainee finds anything unsafe during the Vehicle inspection, get it fixed. Federal and state laws forbid operating an unsafe vehicle. • Check vehicle operation regularly: o Instruments. o Air pressure gauge (if the vehicle has air brakes). Temperature gauges. o Pressure gauges. Ammeter/voltmeter. o Mirrors. o Tires. o Cargo, cargo covers. Lights, etc.

	o If the trainee sees, hears, smells, or feels anything that might mean trouble, he/she should check it out. • Safety inspection. • Document any discrepancy on AF Form 1800. Sign-off AF Form 1800 to signify accomplishment of inspection.

Figure A4.2. Additional Steps for Inspecting Air Brakes System.

Additional Steps for Inspecting Air Brakes	
Step	**Procedure**
2. Engine Compartment Checks	• Check air compressor drive belt condition and tightness (if compressor is belt driven).
5. Walk-Around Inspecting	• Check manual slack adjusters on S-cam brakes. **Note:** Vehicles with automatic slack adjustors still must be checked. o Park on level ground and chock the wheels. o Release the parking brakes so the operator can move the slack adjusters. o Use gloves and pull hard on each slack adjuster that it can be reached. o Check brake drums (or discs), linings, and hoses.
7. Final Air Brake Check	• Test low pressure warning signal. o Shut the engine off when the vehicle has enough air pressure so that the low pressure warning signal is not on. o Turn the electrical power on. o Step on and off the brake pedal to reduce air tank pressure. o Low air pressure warning signal should come on before the pressure drops to less than 60 psi in the air tank with lowest pressure. • Check that the spring brakes come on automatically. o Chock the wheels. o Release the parking brakes when enough air pressure is built up. o Shut the engine off. o Step on and off the brake pedal to reduce the air tank pressure. o "Parking brake" knob should pop out when the air pressure falls to the manufacturer's specification. • Check rate of air pressure buildup o Refer to manufacturer’s recommendation for average buildup time. o If not within recommended time, the air pressure may drop too low during driving operations. • Test air leakage rate. o With a fully-charged air system (typically 125 psi).

	o Turn-off the engine. o Release the service brake and time the air pressure drop. o The loss rate should be less than 2 psi in one minute for single vehicles. o Not less than 3 psi in 1 minute for combination vehicles. • Then apply 90 psi or more with the brake pedal. o After the initial pressure drop, if the air pressure falls more than 3 psi in 1 minute for single vehicles. o Not more than 4 psi for combination vehicles. • Check air compressor governor cut-in and cut-out pressures. o Air compressor should start at about 100 psi and stop at about 125 psi. o Run the engine at a fast idle. o Air governor should cut-out the air compressor at about the manufacturer's specified pressure. o Engine idling, step on and off brake to reduce air tank pressure. o Compressor should cut-in at manufacturer's specified cut-in pressure. o Test parking brake: Stop the vehicle; put the parking brake on; gently pull against it in low gear to determine if parking brake will hold. ▪ Test service brakes. ▪ Wait for normal air pressure. • Release the parking brake. • Move the vehicle forward slowly (about 5 mph). • Apply the brakes firmly using the brake pedal. • Note any vehicle "pulling" to one side, unusual feel, or delayed stopping action.